Panasonic

SERVICE MANUAL

R410A

MINI VRF SYSTEM

Model No.

Outdoor Units

Class	36	52
Model Name	U-36LE1U6 U-36LE1U6E*	U-52LE1U6 U-52LE1U6E*

Refrigerant R410A is used in the outdoor units.

* Salt-Air Damage Resistant Specifications.

Indoor Units

	Class	7	9	12	15	18	19	24	36	48	54
U1	4-Way Cassette			S-12MU1U6		S-18MU1U6		S-24MU1U6	S-36MU1U6		
Y1	4-Way Cassette 60×60			S-12MY1U6		S-18MY1U6					
D1	1-Way Cassette	S-07MD1U6	S-09MD1U6	S-12MD1U6							
F1	Low Silhouette Ducted	S-07MF1U6	S-09MF1U6	S-12MF1U6	S-15MF1U6	S-18MF1U6		S-24MF1U6	S-36MF1U6	S-48MF1U6	S-54MF1U6
M1	Slim Low Static Ducted	S-07MM1U6	S-09MM1U6	S-12MM1U6	S-15MM1U6	S-18MM1U6					
E1	High Static Pressure Ducted								S-36ME1U6	S-48ME1U6	
T1	Ceiling			S-12MT1U6		S-18MT1U6		S-24MT1U6			
K1	Wall Mounted	S-07MK1U6	S-09MK1U6	S-12MK1U6		S-18MK1U6	S-19MS1U6**	S-24MK1U6			
P1	Floor Standing	S-07MP1U6	S-09MP1U6	S-12MP1U6	S-15MP1U6	S-18MP1U6		S-24MP1U6			
R1	Concealed Floor Standing	S-07MR1U6	S-09MR1U6	S-12MR1U6	S-15MR1U6	S-18MR1U6		S-24MR1U6			

** Necessary to install the External Electronic Expansion Valve Kit (Optional:CZ-P56SVK1U).

85464849297000

REFERENCE NO. SM830197-00

IMPORTANT!
Please Read Before Starting

This air conditioning system meets strict safety and operating standards. As the installer or service person, it is an important part of your job to install or service the system so it operates safely and efficiently.

For safe installation and trouble-free operation, you must:

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state, and national electrical codes.
- Pay close attention to all warning and caution notices given in this manual.

This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.

This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

If Necessary, Get Help

These instructions are all you need for most installation sites and maintenance conditions. If you require help for a special problem, contact our sales/service outlet or your certified dealer for additional instructions.

In Case of Improper Installation

The manufacturer shall in no way be responsible for improper installation or maintenance service, including failure to follow the instructions in this document.

SPECIAL PRECAUTIONS

WARNING When Wiring

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY A QUALIFIED, EXPERIENCED ELECTRICIAN SHOULD ATTEMPT TO WIRE THIS SYSTEM.

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause **accidental injury or death.**
- **Ground the unit** following local electrical codes.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.
- To prevent possible hazards from insulation failure, the unit must be grounded.

When Transporting

Be careful when picking up and moving the indoor and outdoor units. Get a partner to help, and bend your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut your fingers.

When Installing…

Select an installation location which is rigid and strong enough to support or hold the unit, and select a location for easy maintenance.

…In a Room

Properly insulate any tubing run inside a room to prevent "sweating" that can cause dripping and water damage to walls and floors.

Keep the fire alarm and the air outlet at least 5 feet away from the unit.

…In Moist or Uneven Locations

Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the outdoor unit. This prevents water damage and abnormal vibration.

…In an Area with High Winds

Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable air baffle.

…In a Snowy Area (for Heat Pump-type Systems)

Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow vents.

When Connecting Refrigerant Tubing

- Ventilate the room well, in the event that is refrigerant gas leaks during the installation. Be careful not to allow contact of the refrigerant gas with a flame as this will cause the generation of poisonous gas.
- Keep all tubing runs as short as possible.
- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

- When performing piping work do not mix air except for specified refrigerant (R410A) in refrigeration cycle. It causes capacity down, and risk of explosion and injury due to high tension inside the refrigerant cycle.
- Refrigerant gas leakage may cause fire.
- Do not add or replace refrigerant other than specified type. It may cause product damage, burst and injury etc.

- Do not leak refrigerant while piping work for an installation or re-installation, and while repairing refrigeration parts.
  Handle liquid refrigerant carefully as it may cause frostbite.

When Servicing

- Turn the power OFF at the main power box (mains) before opening the unit to check or repair electrical parts and wiring.

- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.

WARNING

- Do not clean inside the indoor and outdoor units by users. Engage authorized dealer or specialist for cleaning.
- In case of malfunction of this appliance, do not repair by yourself. Contact to the sales dealer or service dealer for a repair.

CAUTION

- Do not touch the air inlet or the sharp aluminum fins of the outdoor unit. You may get injured.

- Ventilate any enclosed areas when installing or testing the refrigeration system. Escaped refrigerant gas, on contact with fire or heat, can produce dangerously toxic gas.
- Confirm after installation that no refrigerant gas is leaking. If the gas comes in contact with a burning stove, gas water heater, electric room heater or other heat source, it can cause the generation of poisonous gas.

Others

CAUTION

- Do not touch the air inlet or the sharp aluminum fins of the outdoor unit. You may get injured.

- Do not sit or step on the unit, you may fall down accidentally.

- Do not stick any object into the FAN CASE.
  You may be injured and the unit may be damaged.

Check of Density Limit

The room in which the air conditioner is to be installed requires a design that in the event of refrigerant gas leaking out, its density will not exceed a set limit.

The refrigerant (R410A), which is used in the air conditioner, is safe, without the toxicity or combustibility of ammonia, and is not restricted by laws imposed to protect the ozone layer. However, since it contains more than air, it poses the risk of suffocation if its density should rise excessively. Suffocation from leakage of refrigerant is almost non-existent. With the recent increase in the number of high density buildings, however, the installation of multi air conditioner systems is on the increase because of the need for effective use of floor space, individual control, energy conservation by curtailing heat and carrying power, etc.
Most importantly, the multi air conditioner system is able to replenish a large amount of refrigerant compared to conventional individual air conditioners. If a single unit of the multi air conditioner system is to be installed in a small room, select a suitable model and installation procedure so that if the refrigerant accidentally leaks out, its density does not reach the limit (and in the event of an emergency, measures can be made before injury can occur).

ASHRAE and the International Mechanical Code of the ICC as well as CSA provide guidance and define safeguards related to the use of refrigerants, all of which define a Refrigerant Concentration Level (RCL) of 25 pounds per 1,000 cubic feet for R410A refrigerant.
For additional guidance and precautions related to refrigerant safety, please refer to the following documents:

International Mechanical Code 2009 (IMC-2009)
(or more recently revised)
ASHRAE 15
ASHRAE 34

Precautions for Installation Using New Refrigerant

1.Care regarding tubing

1-1.Process tubing

- Material:Use C1220 phosphorous deoxidized copper specified in JIS H3300 “Copper and Copper Alloy Seamless Pipes and Tubes.”
- **Tubing size:Be sure to use the sizes indicated in the table below.**
- Use a tube cutter when cutting the tubing, and be sure to remove any flash.This also applies to distribution joints (optional).
- When bending tubing, use a bending radius that is 4 times the outer diameter of the tubing or larger.

Use sufficient care in handling the tubing.Seal the tubing ends with caps or tape to prevent dirt,moisture,or other foreign substances from entering.These substances can result in system malfunction.

Unit: in. (mm)

Material		O				
Copper tube	Outer diameter	1/4 (6.35)	3/8 (9.52)	1/2 (12.7)	5/8 (15.88)	3/4 (19.05)
	Wall thickness	1/32 (0.8)	1/32 (0.8)	1/32 (0.8)	5/128 (1.0)	5/128 (1.0)

1-2. Prevent impurities including water, dust and oxide from entering the tubing. Impurities can cause R410A refrigerant deterioration and compressor defects. Due to the features of the refrigerant and refrigerating machine oil, the prevention of water and other impurities becomes more important than ever.

2. Be sure to recharge the refrigerant only in liquid form.

2-1. Since R410A is a non-azeotrope, recharging the refrigerant in gas form can lower performance and cause defects of the unit.

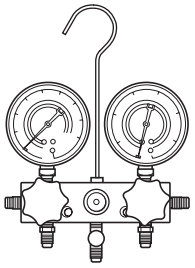
2-2. Since refrigerant composition changes and performance decreases when gas leaks, collect the remaining refrigerant and recharge the required total amount of new refrigerant after fixing the leak.

3. Different tools required

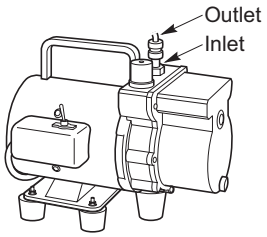
3-1. Tool specifications have been changed due to the characteristics of R410A. Some tools for R22- and R407C-type refrigerant systems cannot be used.

Item	New tool?	R407C tools compatible with R410A?	Remarks
Manifold gauge	Yes	No	Types of refrigerant, refrigerating machine oil, and pressure gauge are different.
Charge hose	Yes	No	To resist higher pressure, material must be changed.
Vacuum pump	Yes	Yes	Use a conventional vacuum pump if it is equipped with a check valve. If it has no check valve, purchase and attach a vacuum pump adapter.
Leak detector	Yes	No	Leak detectors for CFC and HCFC that react to chlorine do not function because R410A contains no chlorine. Leak detector for HFC134a can be used for R410A.
Flaring oil	Yes	No	For systems that use R22, apply mineral oil (Suniso oil) to the flare nuts on the tubing to prevent refrigerant leakage. For machines that use R407C or R410A, apply synthetic oil (ether oil) to the flare nuts.

Manifold gauge

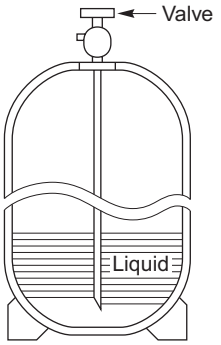


Vacuum pump



* Using tools for R22 and R407C and new tools for R410A together can cause defects.

3-2.Use R410A exclusive cylinder only.



Single-outlet valve

(with siphon tube)

Liquid refrigerant should be recharged with the cylinder standing on end as shown.

New refrigerant R410A cannot be used for earlier models

1.Compressor specifications are different.

If recharging a R22 or R407C compressor with R410A, durability will significantly decrease since some of the materials used for compressor parts are different.

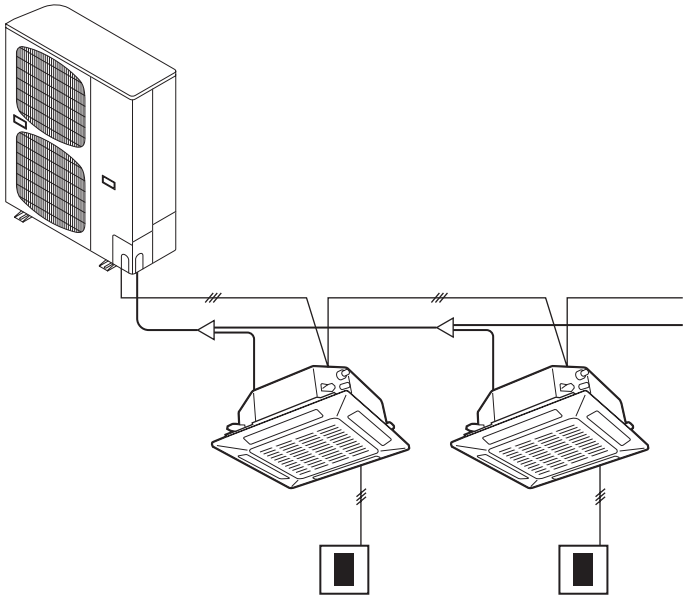
2.Existing tubing cannot be used (especially R22).

Completely cleaning out residual refrigerating machine oil is impossible, even by flushing.

3.Refrigerating machine oil differs (R22).

Since R22 refrigerating machine oil is mineral oil, it does not dissolve in R410A.Therefore, refrigerating machine oil discharged from the compressor can cause compressor damage.

R22 refrigerating machine oil	Mineral oil (Suniso oil)
R407C refrigerating machine oil	Synthetic fluid (ether oil)
R410A refrigerating machine oil	Synthetic fluid (ether oil)



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1. CONTROL FUNCTIONS

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OUTDOOR UNIT

Mini VRF is a multi system that is connected to a single outdoor unit. The outdoor unit contains an inverter compressor.

To operate this system, the below settings must be made at the time of the test run.

Table 1-1

Setting item	At shipment from factory	Settable range
System address	1	System 1 – 30
No. of indoor units	1	1 – (15) units *

* Up to a maximum of 15 indoor units can be set, however the maximum number of units which can be connected is shown below for each outdoor unit capacity.

Table 1-2

	4HP	5HP	6HP
Maximum number of connected indoor units	6	8	9

Be sure to connect indoor units so that the resulting indoor-outdoor capacity ratio (total capacity of all indoor units compared with the outdoor unit capacity) is within the range of 50% – 130%.

2-1. Compressors Mounted on Outdoor Units

Capacity	Type	4HP	5HP	6HP
Compressors mounted	Rotary	DC Inverter		

2-2. Compressor Stop Rules

After a compressor stops, it will not start again for a period of 3 minutes (3 minutes forced OFF). However, this does not apply to the Special Control described later, when operation of the compressor is forcibly stopped as part of a control operation.

2-3. Roadmap Control

(1) The controls listed below are performed according to the pressure sensor attached to the outdoor unit and temperature thermistor attached to the indoor / outdoor unit heat exchanger.

* With roadmap control, the pressure detected by the pressure sensor is converted to saturation temperature before it is used. The temperature that has been converted to the saturation temperature is called the pressure sensor temperature.

(2) This control is performed every 30 seconds.

(3) In the evaporation temperature control and condensation temperature control shown in Figs. 1-1 and 1-2, the temperatures used to judge each area (A, AB, B, and C) may vary depending on the relationships among factors including the difference between the room temperature setting and the indoor unit air intake temperature (= air intake temperature difference) and the difference between the air discharge temperature setting and the air discharge temperature (= air discharge temperature difference).

(4) Definitions of the evaporation temperature and condensation temperature

Evaporation temperature (=Te) : Lowest temperature of the heat exchangers (E1, E3) in all indoor units.

Condensation temperature (=Tc) : The value used for judgment in Cooling mode and Heating mode is different depending on the mode.

Cooling mode : The outdoor unit pressure sensor temperature or the outdoor unit heat exchanger liquid temperature, whichever temperature is higher.

Heating mode : The outdoor unit pressure sensor temperature or the indoor unit heat exchanger temperature (E1) when the heating thermostat is ON, whichever temperature is higher.

* The E3 temperature may indicate the temperature of superheated gas. Therefore it is not included for detection of the condensation temperature (=Tc).

2-3-1. Roadmap control in cooling mode

With this control, the below evaporation temperature control and condensation temperature control are both used.
Control is performed according to the following order of priority:

Control order of priority Area C > Area B > Area A

Example: When Evaporation temperature control = Area A, and Condensation temperature control = Area C, then based on the above order or priority, the result is “Area C = Reduce horsepower.”

Evaporation temperature (=Te) control

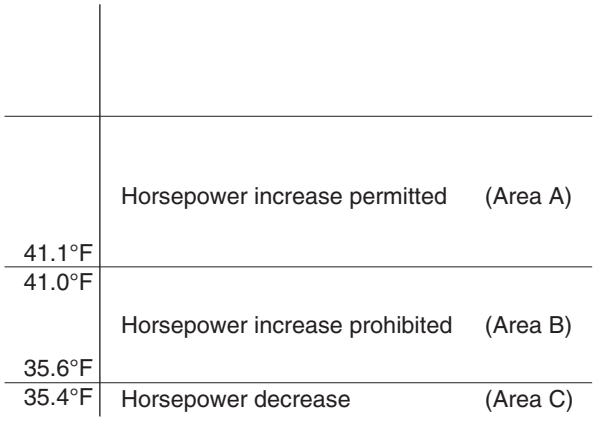


Fig. 1-1

(1) For indoor units that are operating in Cooling mode, if one unit is selected for a test run, then the air intake temperature difference (difference between the room temperature setting and indoor unit air intake temperature) is ignored, and areas B and C are considered to be area A for control purposes. (This is used for additional refrigerant charging, test run checks, etc.)
For this reason, vapor may be discharged if the test run continues for a long period of time, however this does not indicate a problem. In addition, the test run is canceled automatically after 1 hour.

(2) Even within the same area, the compressor capacity varies depending on the refrigerant temperature.

(3) For 6 minutes after the compressors start, area C is considered to be area B for control purposes.

(4) During special control, control of the compressor capacity according to Te is not performed.

(5) If the thermostat turns OFF while Te is within area C, the next time the compressor starts it may restart from a lower capacity.

(6) When the area changes to area C, area C is considered to be area B for control purposes for the first 6 minutes, even if the horsepower is the minimum value within the range where capacity control is possible (operation with inverter frequency of 25 Hz only). Subsequently if C area continues, the thermostat turns OFF.

Condensation temperature (=Tc) control

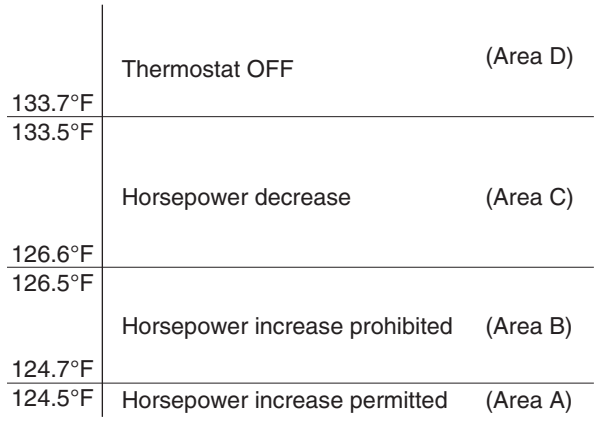


Fig. 1-2

2-3-2. Roadmap control in heating mode

Roadmap control is performed using the below condensation temperature control.

Condensation temperature (=Tc) control

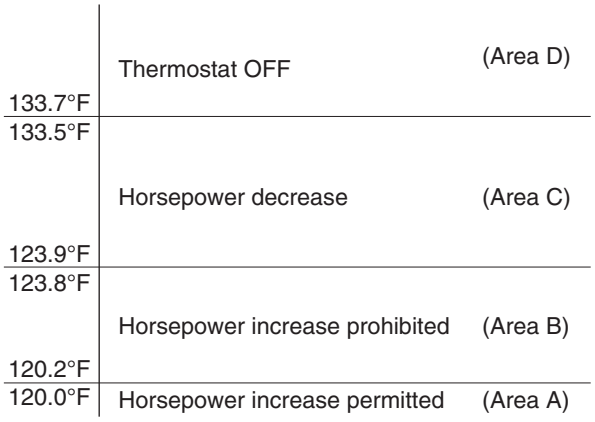


Fig. 1-3

(1) For indoor units that are operating in Heating mode, if one unit is selected for a test run, the air intake temperature difference is ignored; however, Tc control is performed according to Fig. 1-3 in order to prevent excessive load. (This is used for test run checks, etc.)

(2) Even within the same area, the compressor capacity varies depending on the refrigerant temperature.

(3) If the condensation temperature (Tc) enters area D and the thermostat turns OFF, the next time the compressor starts it may restart from a lower capacity.

(4) When the area changes to area C, area C is considered to be area B for control purposes for the first 6 minutes, even if the horsepower is the minimum value within the range where capacity control is possible (operation with inverter frequency of 25 Hz only). Subsequently if C area continues, the thermostat turns OFF.

2-3-3. Protection control

Protection control consists of 2 types of protection: compressor air discharge temperature protection and current protection. The limit values from this protection control are incorporated into the output compressor capacity increase/decrease values that were calculated from roadmap control.

* In some cases, the control shown below may stop the compressor, issue an alarm, or reduce the compressor capacity.

(1) Air discharge temperature protection

The compressor capacity is limited by using the air discharge temperature of the operating compressor (as shown in the tables below).

(Air discharge temperature level: Highest level among the air discharge temperature levels of all compressors)

Air discharge temperature level	Horsepower (hp) limits
221	+2 hp down
219	+1 hp down
215	+0.5 hp down
210 – Less than 215	Hp increase prohibited
204 – Less than 210	Hp increase permitted (slowly)
Less than 204	No restriction

The values shown in the table above are reduced to the values calculated by roadmap control.

(2) Current protection

Inverter compressor current control is composed of primary current control and secondary current control. Current protection control for the inverter compressor is performed by self-protection in the inverter circuit, and is not based on a calculated increase/decrease in compressor capacity.

	Primary current Control		**Secondary current Control**
Compressor	4 / 5 HP	6 HP	Secondary current
Stop	More than 25.0 A	More than 29.5 A	More than 32.5 A
Hz Down	23.5 A – Less than 25.0 A	28.0 A – Less than 29.5 A	25.0 A – Less than 32.5 A
Hz Not_up	22.5 A – Less than 23.5 A	27.0 A – Less than 28.0 A	24.0 A – Less than 25.0 A
Follows normal operation	Less than 22.5 A	Less than 27.0 A	Less than 24.0 A

2-4. Roadmap Control After Trip

When restarting after trip-stop occurs, the horsepower may increase slowly depending on the trip counter value.

(1) If trip counter = 1, the horsepower increases at a speed that is 1/2 of ordinary roadmap control.

(2) If trip counter = 2, the horsepower increases at a speed that is 1/3 of ordinary roadmap control.
The trip counter is cleared if no trip occurs within 10 minutes after operation starts.

In addition to ordinary heating and cooling operation, this system also includes the following 4 types of special controls for control of the system as a whole:

3-1. 4-way valve switching control
3-2. Reverse cycle start control
3-3. Inter systems refrigerant oil recovery control
3-4. Reverse cycle defrost control

3-1. 4-way Valve Switching Control

4-way valve switching control is performed under the following conditions:

- The indoor unit operating mode has been switched (Cooling mode / Heating mode).
- The power is turned ON and the microcomputer has been initialized.
- Reverse cycle start control has ended.

This control is performed in order to ensure reliable switching of the 4-way valve. It also performs control to compensate for tubing heat radiation loss when heating starts after the outdoor unit was stopped for a long time, and control for oil recovery.

(1) Control when the outdoor unit heat exchanger is functioning as a condenser (indoor unit mode = Cooling)

Control time		1 minute
Outdoor units		Operates at a compressor frequency of 44 Hz.
Indoor units	**Electronic control valve**	All indoor units operate at a fixed pulse according to the indoor unit capacity.
	Fan	The fan operates at the set fan speed, is stopped, or operates at “L” fan speed, according to the operation mode of the indoor unit.

* When the above operation is finished, normal operation starts at the horsepower determined by the indoor units where thermostats are ON.

(2) Control when outdoor unit heat exchanger is functioning as an evaporator (indoor unit mode = Heating)

Control time		Min. 1 minute to Max. 5 minutes (until Tc ≥ 95°F)
Outdoor units		Operates at a compressor frequency of 44 Hz.
Indoor units	**Electronic control valve**	All indoor units operate at 480 pulses.
	Fan	The fan stops.

* When the above operation is finished, normal operation starts at the horsepower determined by the indoor units where thermostats are ON.

3-2. Reverse Cycle Start Control

Reverse cycle start control is performed under the following conditions:

- The outdoor unit starts in Heating mode after microcomputer initialization when the power was turned ON.
- The outdoor unit starts in Heating mode after it was stopped for 1 hour or longer.

When the outdoor unit starts in Heating mode after having been stopped for a long period of time, this control first operates the unit in Cooling mode to return refrigerant from the outdoor unit heat exchanger to the liquid tubing. This prevents back-flow of the refrigerant liquid which had accumulated in the outdoor unit heat exchanger.

Control time		1 minute
Outdoor units		Operates at a compressor frequency of 46 Hz.
Indoor units	**Electronic control valve**	All indoor units operate at a fixed pulse according to the indoor unit capacity.
	Fan	The fan operates at the set fan speed, is stopped, or operates at "L" fan speed, according to the operation mode of the indoor unit.

3-3. Inter Systems Refrigerant Oil Recovery Control

3-3-1. Inter systems refrigerant oil recovery cycle

In both indoor unit Cooling mode and Heating mode, this control is performed in the cooling cycle after a certain amount of time has passed.

3-3-2. Start of inter systems refrigerant oil recovery control

This control is performed periodically after the total compressor operating time exceeds 150 minutes.

3-3-3. Flow of inter systems refrigerant oil recovery control

(1) Simplified flow of inter systems refrigerant oil recovery control

Inter systems refrigerant oil recovery control follows this flow process:

Normal operation → 1-minute stop → Inter systems refrigerant oil recovery control (3-minute) → 1-minute stop → Normal operation

Control time		3 minutes (stops once before and after control)
Outdoor units		Operates at a compressor frequency of 65 Hz. However depending on the operating conditions, the frequency may be lower than this value.
Indoor units	**Electronic control valve**	All indoor units operate at a fixed pulse according to the indoor unit capacity.
	Fan	The fan operates at the set fan speed, is stopped, or operates at "L" fan speed, according to the operation mode of the indoor unit.

3-4. Reverse cycle Defrost Control

3-4-1. Defrost control method

Defrost with this system is done by reverse cycle defrost.

3-4-2. Conditions for start of defrost

Defrost control is started when the "frost detection" conditions are met, and the "defrost mask time" has elapsed.

3-4-3. Frost detection

(a) Frost is not detected at the outdoor unit heat exchanger for 5 minutes after operation starts.

(b) Frost is detected when either Condition 1 or 2 below is met.

Condition 1:

L2 line or below is detected twice, each time continuously for 4 minutes, when the compressor is operating.

Condition 2:

L1 line or below is detected for a total of 60 minutes when the compressor is operating.

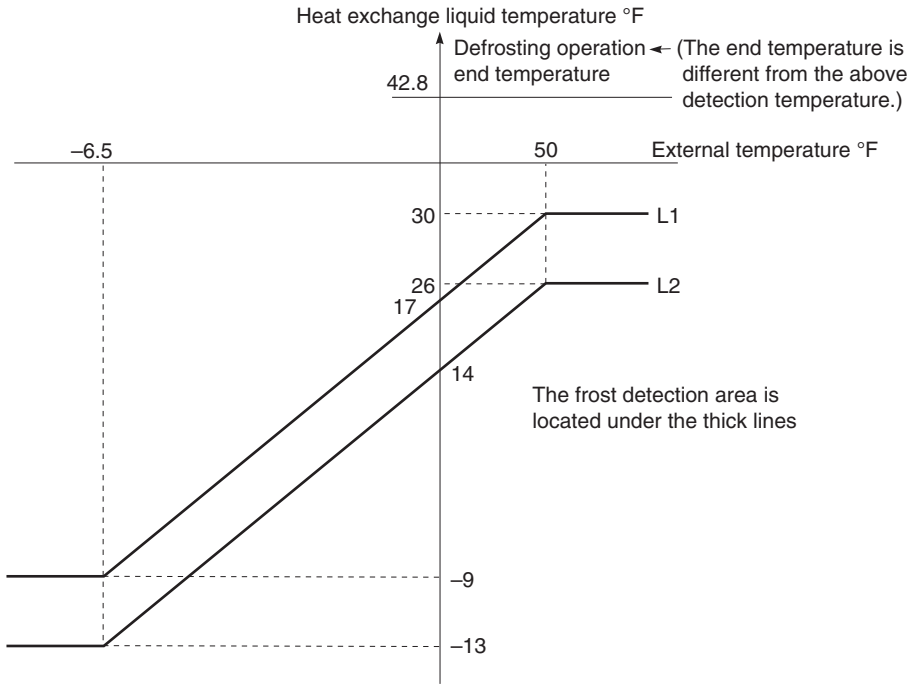


Fig. 1-4

3-4-4. Defrost mask time

The next defrost operation will not start until the defrost mask time (= 35 minutes) has elapsed following the previous defrost operation.

* While defrost control is in effect, if all indoor units stop, or if the outdoor unit is restarted after it was stopped for protective control or a similar reason, then defrost control may start again after a minimum of 10 minutes.

3-4-5. General flow of reverse cycle defrost

(1) General flow of reverse cycle defrost control

Reverse cycle defrost control follows this flow process:

Normal operation → 1-minute stop → Reverse cycle defrost control (Max. 12-minute) → 1-minute stop → Normal operation

Control time		Max. 12 minutes (stops once before and after control)
Outdoor units		Operates at a compressor frequency of 75 Hz. The outdoor fan stops.
Indoor units	**Electronic control valve**	All indoor units operate at a fixed pulse according to the indoor unit capacity.
	Fan	The fan stops.

3-4-6. Defrost end judgment conditions

Defrost ends when the below defrost end conditions are met.

Condition 1: Defrost end judgment occurs when the temperature at the temperature sensor installed on the outdoor heat exchanger is 50°F or higher (or has been 42.8°F or higher continuously for 1 minute).

Condition 2: When the maximum defrost time shown in the table above has elapsed, defrost end judgment occurs.

4. Other Control

4-1. Indoor Unit Self-Separator Oil Recovery Control

Refer to the indoor unit special control item.

5. Operation of Solenoid Valves

5-1. 4-way Valve Control

(1) OFF conditions

- At Cooling mode
- Special control (reverse cycle start control, inter systems refrigerant oil recovery control, reverse cycle defrost control) is in effect.

(2) ON conditions

- At Heating mode

6. Outdoor Unit Electronic Control Valve (Motor Valve) Control [MOV1]

6-1. Power Initialization

The valve position is 480 pulses if the indoor unit has not started once after the power was turned ON.

Operation of the electronic control valve during normal unit operation

Indoor Unit	Heat exchanger status	MOV1	Remarks
Cooling operation	**Condenser**	480	Maximum flow control
	Stop	480	–
Heating operation	**Evaporator**	65 – Less than 480	SH (super heat) control
	Stop	0	–

* SH control controls the difference between outdoor heat exchanger liquid temperature and suction temperature to 2 – 10°F.

7-1. Outdoor Fan (Min. Fan Mode and Max. Fan Mode)

These outdoor units utilize a DC fan motor that can be controlled using a maximum of 15 increments (15 fan modes).

Outdoor unit	Min. fan mode	Max. fan mode
Cooling operation	Outdoor air temp. > 86°F: 3 Outdoor air temp. ≤ 86°F: 1	14
Heating operation	21	4

7-2. Fixed Initial Fan Mode

For the first 30 seconds after operation starts, the mode is fixed at the initial mode that was calculated based on the relationship between the outdoor air temperature and the outdoor unit horsepower.
If the outdoor unit horsepower changes dramatically, the initial mode may be recalculated and may be again fixed for 30 seconds.

7-3. Operation after initial fan mode is fixed

After the fixed initial fan mode, the fan mode is increased or decreased according to the operating conditions.

(1) Indoor cooling operation

(a) The fan mode is increased when the pressure sensor temperature is high, and is decreased when the pressure sensor temperature is low.

* The fan mode is always increased when the pressure sensor temperature is 122°F or higher.

(b) The fan mode may be decreased when symptoms of insufficient gas are detected at an indoor unit.

(2) Indoor heating operation

(a) If the condensation temperature is low, the fan mode is increased at regular intervals.

(b) If the condensation temperature is high, the fan mode is decreased in order to prevent excessive load.

(c) The fan mode may be increased when the outdoor liquid temperature drops to 44°F or below.

7-4. When Compressor Magnet Switch Seizing Alarm Occurs

Because the high pressure may increase, operation occurs at the maximum fan mode.

• Quiet mode operation

For the setting procedure, refer to the separate instructions. When Quiet mode is activated, the maximum fan mode is reduced compared to maximum fan mode during normal operation.

Outdoor unit	Max. fan mode
Cooling operation	12 (*14)
Heating operation	12

* However, during cooling operation if the outdoor air temperature is 91°F or higher, the maximum fan mode is 14.

INDOOR UNIT

8-1. During Normal Control

(1) During Cooling mode operation

		Electronic control valve position (pulses)	
		Outdoor unit operating	Outdoor unit stopped
Stop		20 pulses	20 pulses
Fan		20 pulses	20 pulses
Cooling	**Thermostat OFF**	20 pulses	20 pulses
	Thermostat ON	55 – 480 pulses Performs SH control	—

* The target value for SH control is 4 – 12°F for the temperature difference between E3 and E1, depending on the operating conditions.
However, the SH target value may increase if the required level decreases. In this case, because the electronic control valve position moves toward the closed side, you should not assume that there is insufficient gas.

(2) During Heating mode operation

		Electronic control valve position (pulses)		
		Outdoor unit operating		Outdoor unit stopped
Stop		55 – 80 pulses	Control to prevent refrigerant accumulation	85 pulses
Fan		55 – 80 pulses	Control to prevent refrigerant accumulation	85 pulses
Heat	**Thermostat OFF**	55 – 80 pulses	Control to prevent refrigerant accumulation	85 pulses
	Thermostat ON	55 – 480 pulses	Performs SC distribution control	—

* The target value for SC control is 10 – 40°F for the temperature difference between the pressure sensor temperature and E1, depending on the operating conditions.

8-2. During Special Control

Control type	Operating mode	Target indoor units		Electronic control valve position (pulses)
4-way valve switching control	Cooling	All indoor units		Fixed pulses for cooling, corresponding to the indoor unit capacity
	Heating	All indoor units		480
Reverse cycle start control	Heating	OFF		Fixed pulses, corresponding to the indoor unit capacity
		Fan		Fixed pulses, corresponding to the indoor unit capacity
		Heating	Thermostat ON	Fixed pulses, corresponding to the indoor unit capacity
			Thermostat OFF	Fixed pulses, corresponding to the indoor unit capacity
Inter systems refigerant oil recovery control	Cooling / Heating	All indoor units		Fixed pulses, corresponding to the indoor unit capacity
Reverse cycle defrost control	Heating	OFF		Fixed pulses, corresponding to the indoor unit capacity
		Fan		Fixed pulses, corresponding to the indoor unit capacity
		Heating	Thermostat ON	Fixed pulses, corresponding to the indoor unit capacity
			Thermostat OFF	Fixed pulses, corresponding to the indoor unit capacity

9. Indoor Special Control

9-1. Indoor Unit Thermostat ON/OFF Delay Timer

(1) When an indoor unit thermostat turns ON, the thermostat cannot be turned OFF by the room temperature thermostat discharge temperature thermostat for 3 minutes.
However, if the condensation temperature (refrigerant temperature detected at the condenser) reaches PX temperature or higher, the thermostat may turn OFF in order to prevent excessive loads.

(2) When an indoor unit thermostat turns OFF, it will not turn ON again for a minimum of 3 minutes.

9-2. Indoor Unit Refrigerant Oil Self-recovery Control

* This control is performed constantly during Cooling mode operation only.

(1) The electronic control valve at indoor units that are stopped, or are in Fan mode or in Cooling mode with thermostat OFF, opens for 1 – 2 minutes.

(2) At indoor units that are in Cooling mode with thermostat ON, the electronic control valve opens from its current position by approximately 20 pulses.

10-1. Discharge Gas Temperature Protection

Alarm

The compressor upper-limit discharge temperature is 222°F. If the discharge temperature reaches 222°F, then the compressor stops. If the discharge temperature reaches 222°F 4 times repeatedly after restart, an alarm occurs. After the compressor stops, if the discharge temperature at the stopped compressor is at or above 213°F, the compressor start restriction temperature, then this compressor does not operate until the temperature drops.

List of discharge temperature protections

Compressor model	Compressor type	Stop temperature (°F)	Compressor start restriction temperature (°F)	Alarm display
Compressor 1	Inverter	222	213	P03

10-2. Control For Detection of Discharge Sensor Failures

- If the temperature is at or above sensor failure temperature (176°F) (value in parentheses) 60 minutes after the compressor stopped, an alarm occurs.
- If the discharge gas temperature remains at or above sensor failure temperature (213°F) for 20 minutes after the system is stopped, an alarm occurs.

* In this case, in addition to sensor failure, compressor overheating caused by insufficient refrigerant is also a possibility.

List of discharge sensor failures

Compressor model	Compressor type	Alarm display
Compressor 1	Inverter	F04

11. Current Protection

11-1. Fan Motor

Alarm	Description
P22	Occurs when the fan motor detects overcurrent, or when the fan motor is locked and does not turn.

11-2. Inverter Compressor

Alarm	Description
P16	Occurs when overcurrent (32.5 A) is detected during normal operation.
P26	Occurs under the same conditions as P16, when the inverter compressor is operating at 80 Hz or higher.
P29	Occurs when a missing phase or overcurrent (48 A) is detected when the inverter compressor starts.
H31	Occurs when the HIC detects overcurrent (75 A), and when an abnormal temperature (302°F) is reached.

The inverter current values include primary current and secondary current.
Alarm judgment uses both of these current values. However, in general the secondary current is higher than the primary current.

11-3. CT Circuit Detection Failure

	Alarm	Description
Compressor 1 (inverter compressor)	H03	Occurs when an open circuit is detected in the inverter compressor CT circuit.

If the operating frequency of the inverter compressor is low, the current value is also low.
As a result, this alarm is detected only when the compressor is stopped.

12. Pressure Sensor Failure

This system includes a high-pressure sensor.

12-1. High-Pressure Sensor Failure

Connector disconnection or displacement failure is judged according to the relationship between the high-pressure sensor temperature, which is detected by the high-pressure sensor, and the various temperature thermistors.

However, if the pressure rises suddenly, a high-pressure sensor failure warning may be judged before the high-pressure sensor activates. Therefore check the following before determining that a pressure sensor failure has occurred:

- Has the service valve been left open?
- Is there a blocked circuit?
- Is there leakage of refrigerant into stopped outdoor units?

Also check the difference between the high-pressure as measured by a manifold gauge and the pressure as detected by the pressure sensor.

Alarm	Description
F16	High-pressure sensor failure

13. 4-Way Valve Failure [L18]

When a 4-way valve coil failure, coil disconnection or similar failure occurs, a judgment is made automatically from the operating conditions, and an alarm is output.

The below functions are available, and are selected by the outdoor unit EEPROM settings.

14-1. Outdoor Unit Noise Countermeasures (outdoor Quiet mode function)

This function reduces the operating noise to lessen the noise produced by the outdoor unit. When this mode is selected, noise reduction is given priority during operation, and the outdoor fan mode and compressor operating frequency are restricted (to approximately 80% of capacity).
The following two operations are required in order to engage this mode. (This mode cannot be engaged when neither (1) nor (2) below has been completed.)

(1) Outdoor unit EEPROM settings

Outdoor unit EEPROM 05 can be set from 0 to 1.

EEPROM setting	Max. fan mode	Effect	Capacity ratio
0	14	Normal operation (setting at time of factory shipment)	100%
1	12	Noise reduced by approx. 3 dB from the catalog value.	Approx. 80%

(2) Short-circuit the “SILENT” 2P pin on the outdoor unit PCB.

Noise reduction mode is engaged constantly when this pin is short-circuited. To operate in noise reduction mode only at night, or for similar control at other times, use an external timer (field supply).

1

14-2. Slime Countermeasure: EEPROM 0C (set only on the main unit)

This setting controls the operation of the drain pump.

EEPROM setting	Details of operation
0	Normal operation (setting at time of factory shipment)
1	Drain pump operates for 20 minutes at 2-hour intervals
2	Drain pump operates for 20 minutes, at intervals of 20 minutes
3	Drain pump operates continuously

14-3. Delayed Start for Each System: Outdoor EEPROM 3E

The operation start time can be delayed according to the set system addresses.
This setting reduces voltage drops by preventing multiple systems from starting at the same time when operation is restarted after recovery when multiple operating systems were stopped due to a power outage or other cause.

EEPROM setting	Effect
0	Delayed start is not performed (setting at time of factory shipment)
1	System address: Delay in seconds before start
2	Start after System address × 2 seconds
3	Start after System address × 3 seconds

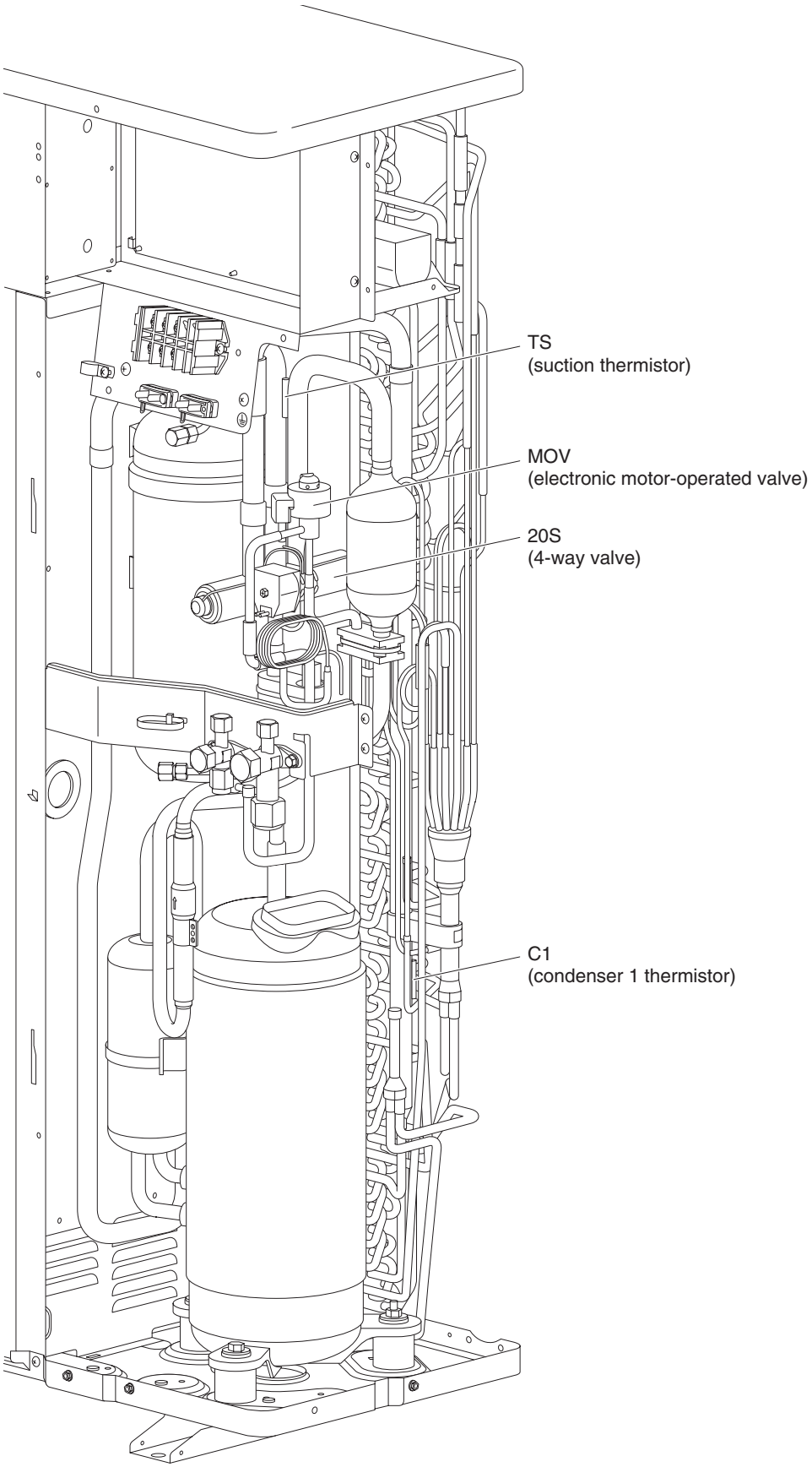
<Reference> Indoor unit discharge temperature control

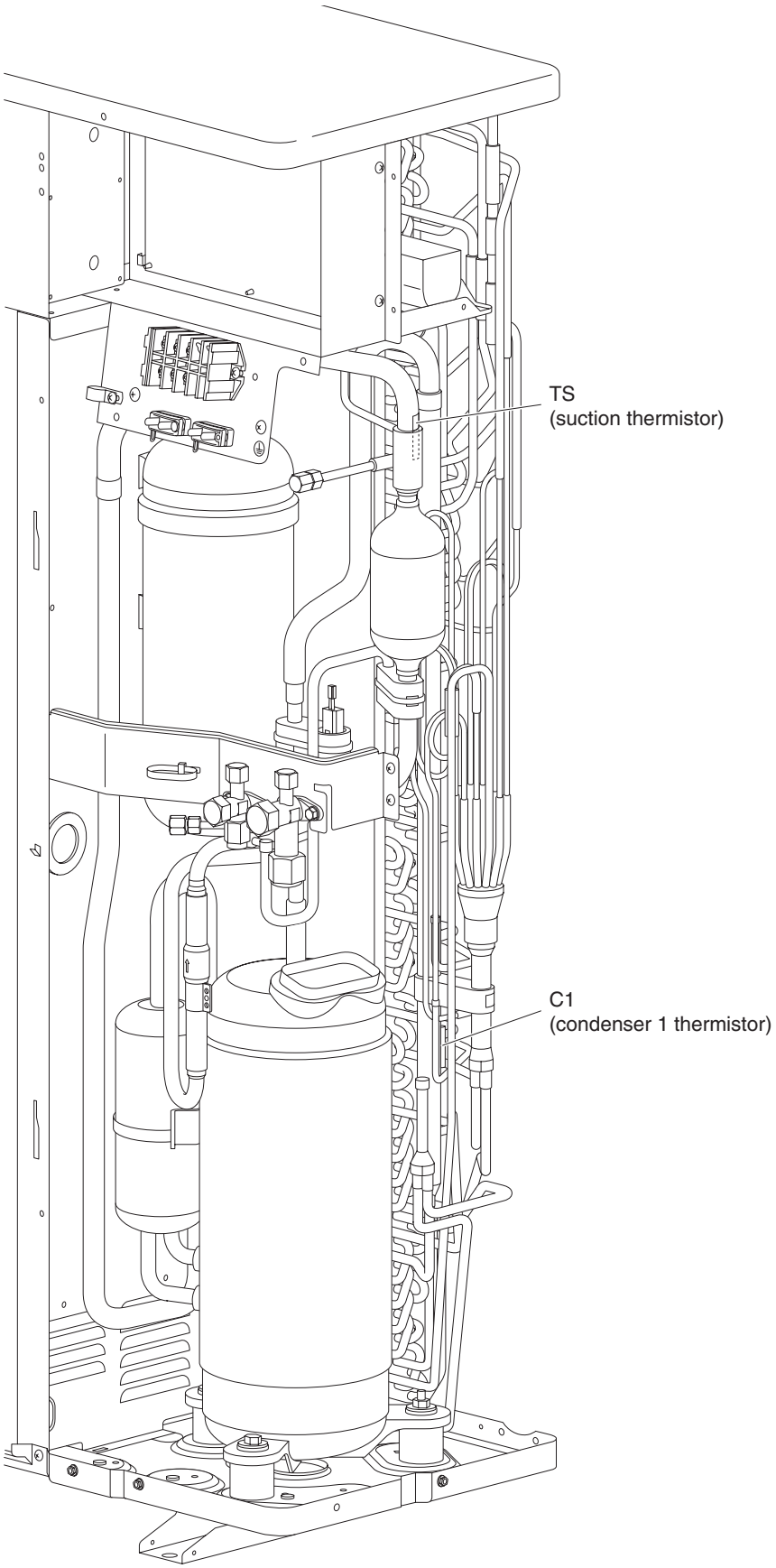
Operating mode	Cooling	Heating
Discharge temperature control value	53	122
Change method	Enter shift value for indoor EEPROM setting “1C.”	Enter shift value for indoor EEPROM setting “1D.”

The method is the same as ordinary indoor unit discharge temperature shift.

2. OUTDOOR UNIT REPAIR PROCEDURES

Layout Diagram: Sensors and Solenoid Valves **2**-2
Layout Diagram: Sensors **2**-3
1. Removing Panels **2**-4
2. Discharging Oil in Compressor **2**-5
3. Recovering Refrigerant **2**-6
4. Checking for Leakage After Repair **2**-11
5. Evacuating System **2**-12
6. Charging Compressor Oil **2**-13
7. Pumping Out Refrigerant from Outdoor Unit **2**-17
8. Compressor **2**-19
9. High Pressure Sensor **2**-22


TS
(suction thermistor)
MOV
(electronic motor-operated valve)
20S
(4-way valve)
C1
(condenser 1 thermistor)


TS
(suction thermistor)
C1
(condenser 1 thermistor)

(1) Front panel removal (Fig. 2-1)

- Remove the front panel (remove 3 screws).

(2) Cover A removal (Fig. 2-1)

- Remove the cover A (remove 1 screw).

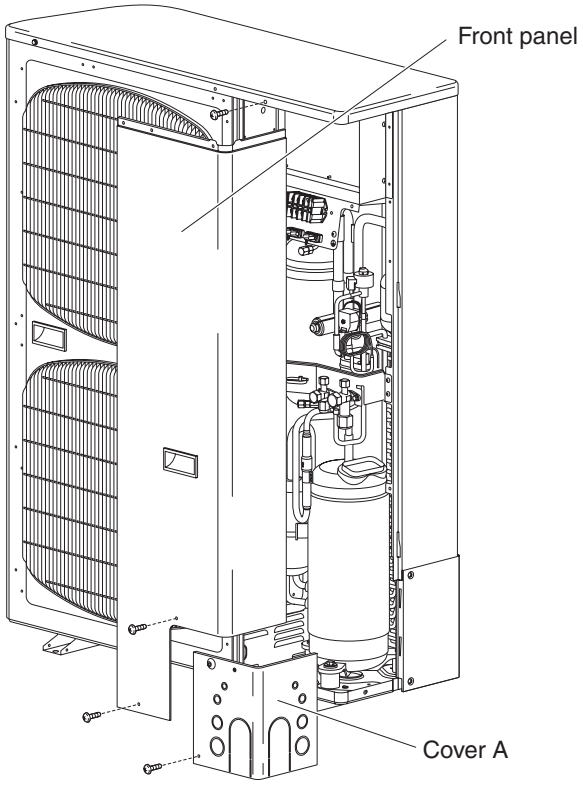


Fig. 2-1

Recover the refrigerant in the outdoor unit following the procedures in “3. Recovering Refrigerant.” Remove the compressor and discharge the oil in it. Refer to “8. Compressor” for detailed procedures.

2-1. Checking the Oil

Acceptance/rejection criteria for the oil

Condition of refrigeration cycle	Condition of oil		Judgment criteria for changing oil*	
	Color	Odor	Total acid value	Hue
Normal	Yellowish	None	0.02 or less	3.5 or less
Abnormal overheat-operation	Brownish	Smells somewhat (not as strong as below)	0.06 or over	4.0 or over
			Changing the oil and system cleaning with dry-cores are necessary.	
Motor burnout	Brownish / blackish	Pungent / burnt odor	Changing the oil and system cleaning with dry-cores are necessary.	

* It is difficult to measure the total acid value in the field, therefore oil hue and odor are the rule of thumb. Checking for carbon deposits and abrasive metal powder can additionally be used to assess the system condition.

The following equipment and tools are required:

Jumper wire with clips, adjustable wrench, set of manifold gauge valves specially designed for refrigerant R410A only, vacuum pump, refrigerant recovery unit, pre-purged refrigerant cylinder for recovery (air already evacuated), and hex wrench (4 mm for liquid tube and 5 mm for gas tube).

3-1. Refrigerant Recovery Procedures (From Outdoor Unit)

(1) Turn off the power of the outdoor unit beforehand (at power mains).

(2) Fully close each service valve on the gas line and liquid line of the outdoor unit.

(3) Connect the outdoor unit's high-pressure and low-pressure outlet ports with the Hi and Lo sides of the manifold gauge valves using hoses. (See Fig. 2-2)

CAUTION

The remaining refrigerant in the outdoor unit may create internal pressure. Before connecting hoses, be sure to confirm that each of the manifold gauge valves is tightly closed. Note that the connection ports employ Schrader-type, press-to-release valves.

(4) Connect the manifold gauge valves, refrigerant recovery unit, and recovery cylinder using hoses. To avoid the entry of air into the refrigerant tubing, carry out this connection work carefully.

CAUTION

For detailed procedures such as connecting the refrigerant recovery unit with the recovery cylinder and methods used for recovery, follow the specific instructions that came with the refrigerant recovery unit.

(5) Locate the AP pins on the control PCB in the outdoor unit and short them using the clips of the jumper wire. Then restore electrical power to the outdoor unit.

CAUTION

By short-circuiting the AP pins, each electronic expansion valve in the outdoor unit is forcibly opened as soon as power comes on, which releases all remaining refrigerant into the recovery cylinder. Since neglecting this procedure may leave some refrigerant in the system, it is important that you carry out this step.

(6) Carry out refrigerant recovery.

CAUTION

To determine the completion of refrigerant recovery, follow the instructions that came with the refrigerant recovery unit.

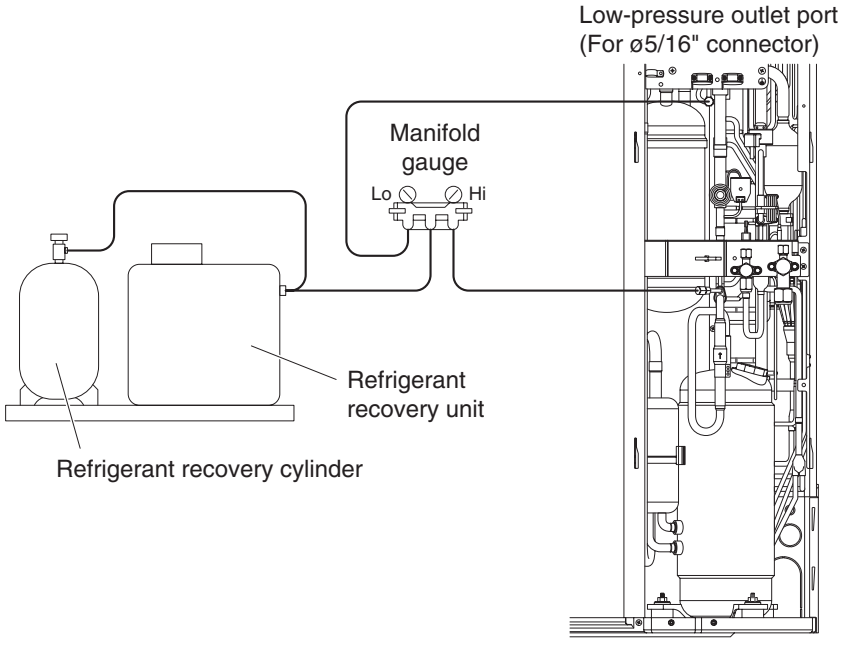
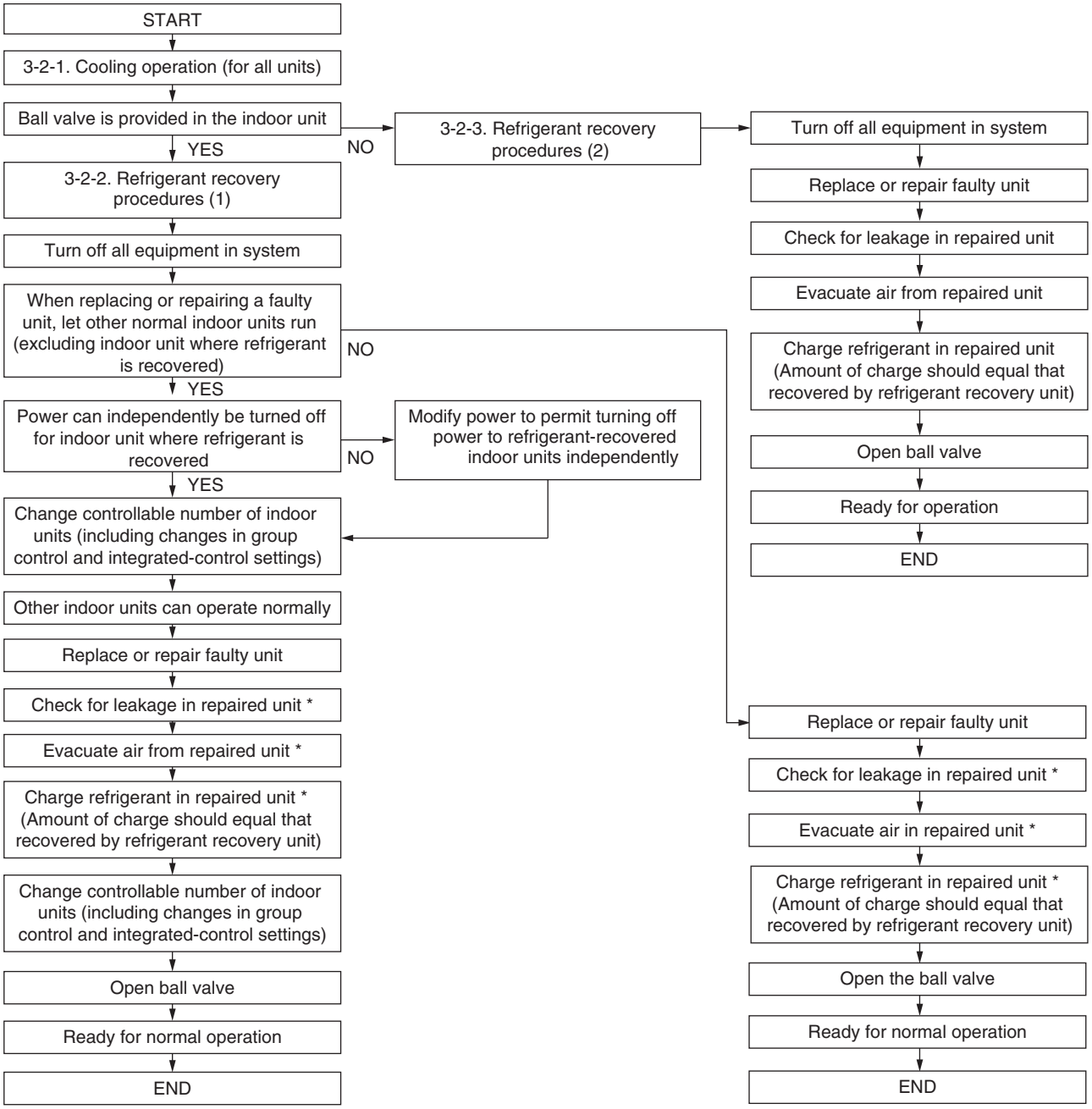


Fig. 2-2

3-2. Refrigerant Recovery Procedures (Indoor Unit)

The flowchart below shows the refrigerant recovery procedures you must follow when replacing or repairing the indoor unit due to trouble in the refrigerant circuit.


START
3-2-1. Cooling operation (for all units)
Ball valve is provided in the indoor unit
NO
3-2-3. Refrigerant recovery procedures (2)
YES
3-2-2. Refrigerant recovery procedures (1)
Turn off all equipment in system
When replacing or repairing a faulty unit, let other normal indoor units run (excluding indoor unit where refrigerant is recovered)
NO
YES
Power can independently be turned off for indoor unit where refrigerant is recovered
NO
Modify power to permit turning off power to refrigerant-recovered indoor units independently
YES
Change controllable number of indoor units (including changes in group control and integrated-control settings)
Other indoor units can operate normally
Replace or repair faulty unit
Check for leakage in repaired unit *
Evacuate air from repaired unit *
Charge refrigerant in repaired unit * (Amount of charge should equal that recovered by refrigerant recovery unit)
Change controllable number of indoor units (including changes in group control and integrated-control settings)
Open ball valve
Ready for normal operation
END
Turn off all equipment in system
Replace or repair faulty unit
Check for leakage in repaired unit
Evacuate air from repaired unit
Charge refrigerant in repaired unit (Amount of charge should equal that recovered by refrigerant recovery unit)
Open ball valve
Ready for operation
END
Replace or repair faulty unit
Check for leakage in repaired unit *
Evacuate air in repaired unit *
Charge refrigerant in repaired unit * (Amount of charge should equal that recovered by refrigerant recovery unit)
Open the ball valve
Ready for normal operation
END

* Service work performed on indoor units is done simultaneously using the service ports at the liquid tube side and the gas tube side ball valves. Refer to each section in the “Installation Instructions” on refrigerant charging, leak checking, and evacuation procedures.

3-2-1. Cooling operation (for all units)

(1) Short-circuit the TEST pin (CN44) on the outdoor control PCB.

(2) Let the unit operate for a while, then check if it is running in Cooling mode or Heating mode by touching the gas line with your finger. If it is running in Heating mode, follow the instructions given in (3) through (5).

Cooling mode : low temperature (lower than 68°F)

Heating mode : high temperature (higher than 140°F)

CAUTION **Be careful when touching the gas line since the tubing may be very hot (about 140°F) during Heating mode.**

(3) If the unit is in Heating mode, release the short-circuit across the test run pins on the outdoor control PCB of the main unit. Then short-circuit the STOP pin (CN49) to stop operation of the unit.

(4) Short-circuit the MODE pin (CN50) on the outdoor control PCB.

* The 4-way valve will not change at this moment; rather, it changes just before start of operation. (It is difficult to confirm the change by listening for the sound.)

(5) Short-circuit the TEST pin (CN44) on the outdoor control PCB. Let the unit operate for a while, then check if it is in Cooling mode by carefully touching the gas line.

3-2-2. Refrigerant recovery procedures (A) (using ball valve near the indoor unit)

Cooling operation

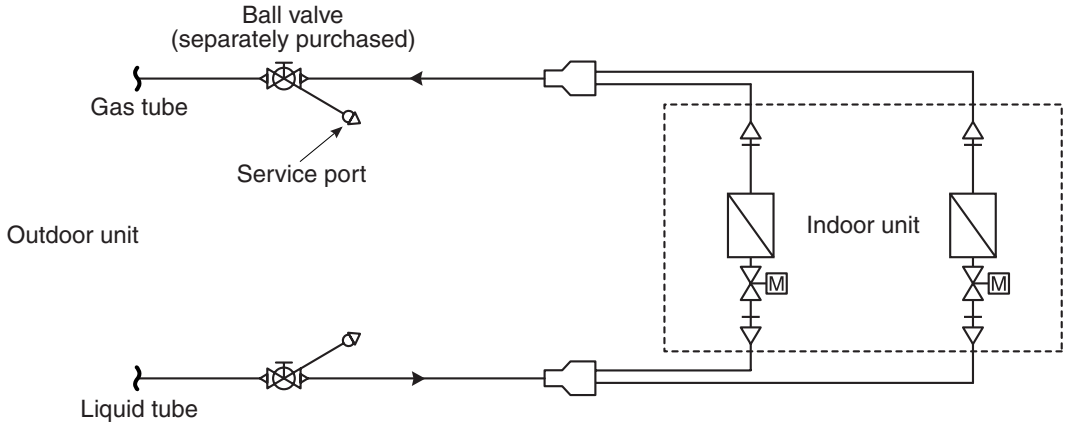


Fig. 2-3

(1) If a ball valve with a service port has been provided near the indoor unit as shown in Fig. 2-3, follow the instructions given in (2) through (6) below. If the service port is instead located in the outdoor side, follow the instructions in "3-2-3. Refrigerant recovery procedures (B)."

(2) After running the unit in Cooling mode for about 5 minutes, fully close the liquid line ball valve.

(3) Run the unit in Cooling mode for 10 to 20 minutes more.

(4) Fully close the gas line service valve.

(5) Use hoses to connect the manifold gauge valves, refrigerant recovery unit, and refrigerant recovery cylinder with each other. (Fig. 2-4) Do each connection quickly to prevent air from entering the tubing.

CAUTION **Remaining refrigerant may create internal pressure, therefore care should be taken when connecting the hoses.**

(6) Recover the remaining refrigerant from the indoor unit using the refrigerant recovery unit.

NOTE

To determine completion of refrigerant recovery, follow the instructions that came with the refrigerant recovery unit.

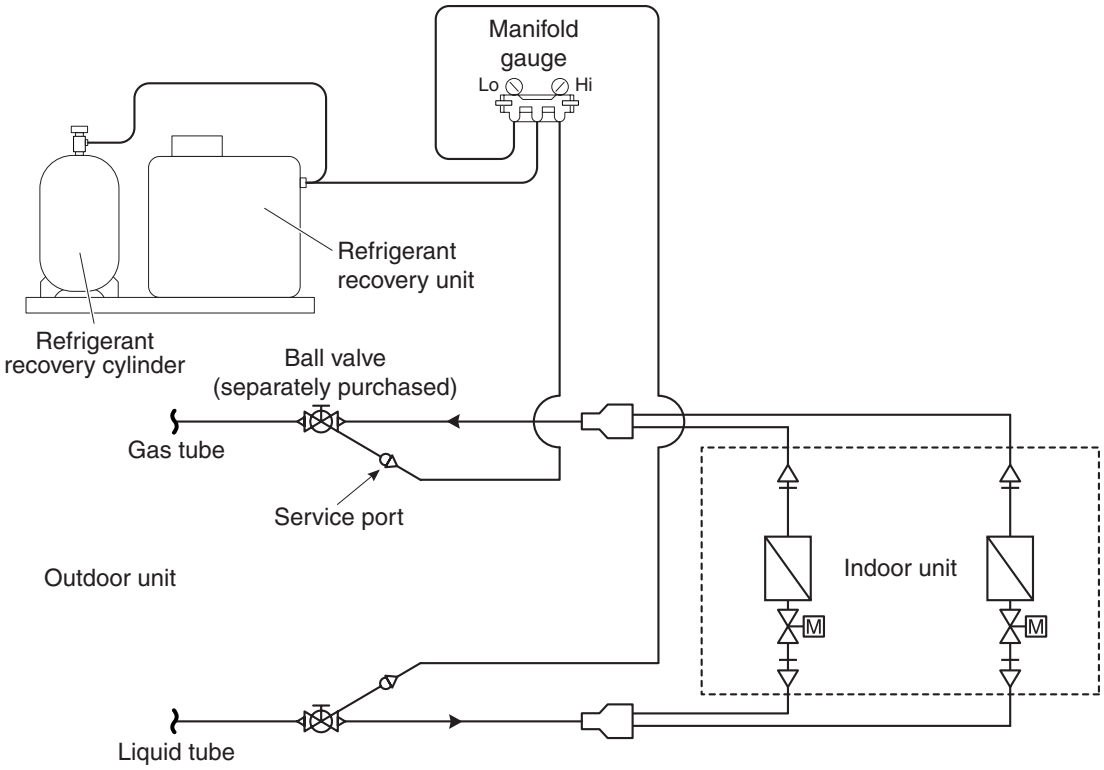

Manifold
gauge
Lo
Hi
Refrigerant
recovery unit
Refrigerant
recovery cylinder
Ball valve
(separately purchased)
Gas tube
Service port
Outdoor unit
Indoor unit
M
M
Liquid tube

Fig. 2-4

3-2-3. Refrigerant recovery procedures (B): for indoor unit with no ball valve

Refrigerant in all indoor units and the refrigerant tubing circuit must be pumped into the outdoor unit (referred to as "pump down"). The maximum refrigerant storage capacity per a single outdoor unit is approx. 123 oz. Thus, in order to collect all refrigerant from the system, a separate refrigerant recovery unit is necessary. Follow these procedures to correctly perform pump down.

(1) Using hoses, connect the manifold gauge valves to both the high-pressure and low-pressure outlet ports of the outdoor unit to be pumped down. Quickly connect each part to prevent air from entering the tubing.

(2) After running the unit in Cooling mode for about 5 minutes, fully close the liquid line valve of the outdoor unit to be pumped down.

(3) When the high-pressure gauge reading shows 478.6 psi or more (or the low-pressure gauge reading falls to 72.5 psi or less), pull out the EXL2 connector (3P) (YEL) (CN037) on the control PCB of the outdoor unit, then immediately close the gas line service valve.

* As soon as the EXL2 connector is pulled out, F24 alarm (abnormal sensor) immediately turns on and the outdoor unit stops.

CAUTION

When pulling out the EXL2 connector, be sure to grasp the connector securely with your fingers and never pull it directly by its wires. When any other connector except the EXL2 is disconnected, the outdoor unit will not stop. Be sure to pull out only the EXL2 connector as described.

(4) Turn off power to all equipment in the system. Then pull out the RC1 connector (4P) (BLU) (CN006) on the outdoor control PCB in the outdoor unit for which pump down has been completed.

(5) Turn on power for all equipment in the system and let the outdoor unit run in Cooling mode.

* Because the test run pins on the outdoor control PCB of the unit have been short-circuited, all units start Cooling mode operation 3 minutes after power ON.

(6) Using hoses with Schrader-type, push-to-release valves, connect the manifold gauge valves to the gas line service port and the liquid line service port in the outdoor unit to undergo pump-down. (Fig. 2-5)

CAUTION

Remaining refrigerant in the system may cause internal pressure. Check that each valve on the manifold gauge is tightly closed. A Schrader-type, push-to-release valve is provided for each connection port.

(7) Use hoses to connect the manifold gauge valves, refrigerant recovery unit, and refrigerant recovery cylinder. Quickly connect each part to prevent air from entering the tubing.

(8) Recover remaining refrigerant from the inter-unit tubing and indoor units using the refrigerant recovery unit.

NOTE

To determine the completion of refrigerant recovery, follow the instructions that came with the refrigerant recovery unit.

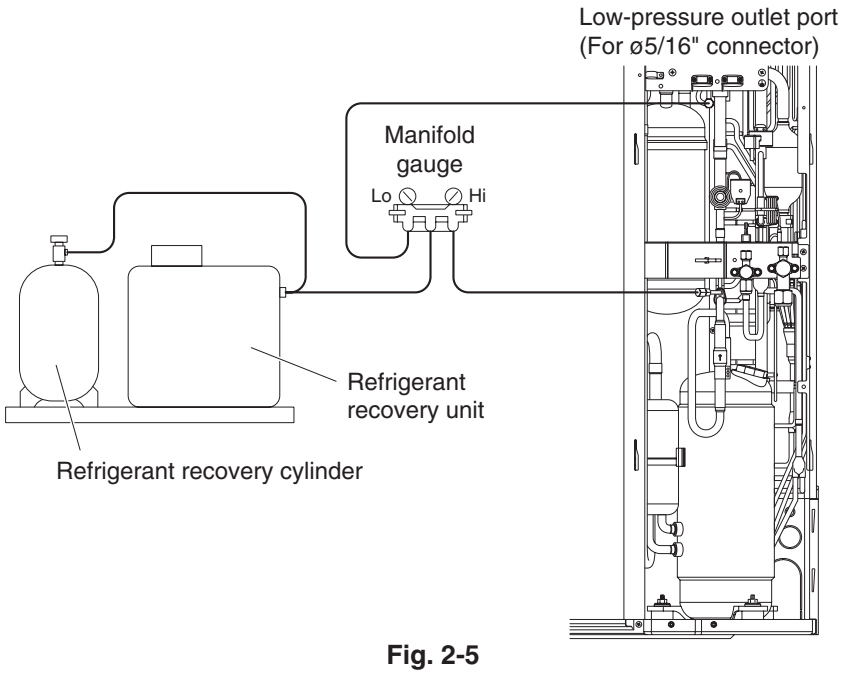


Fig. 2-5

4-1. Pressure Check for Leakage of Outdoor Unit

After completing repair of the outdoor unit, carry out the following leakage check.

(1) Check that all service valves for gas line, and liquid line in the repaired outdoor unit are fully closed.

(2) Connect the manifold gauge valves to the high- and low-pressure sensor outlets of the outdoor unit.

(3) Feed nitrogen gas into the circuit until 362.6 psi pressure is reached. If it is apparent that the nitrogen gas is not entering the repaired section, interrupt the feeding. Short-circuit the AP pins (CN46) on the outdoor unit control PCB, turn on power to run the outdoor unit, then resume feeding nitrogen.

(4) Apply soapy water to the repaired part (such as a newly welded part), and briefly inspect for any leakage. If there are any leaks, bubbles will show on the tubing surface.

* To continue the air-tight check after the brief leak inspection, turn on power while short-circuiting the AP pins. Again feed in nitrogen gas to obtain a system pressure of 362.6 psi. Then measure both the outdoor ambient temperature and the pressure in the system. Leave the system in this state for 1 full day and night, and again measure the outdoor ambient temperature and pressure (to determine any reduced values). During the inspection, it is recommended that an awning or cover be used to shield the unit in case of rain. If no problem is found, purge all nitrogen from the system.

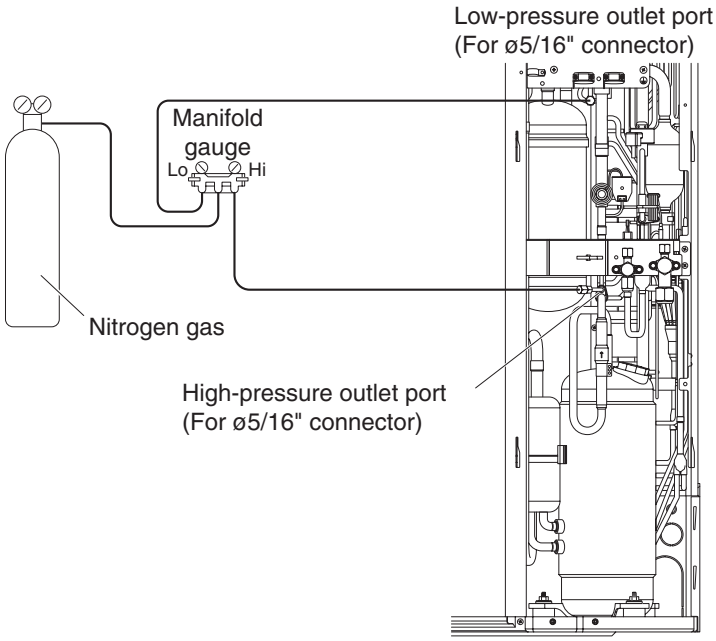


Fig. 2-6

4-2. Checking for Leakage in Refrigerant Tubing Between Indoor and Outdoor Units

Refer to the “Installation Instructions” that came with the outdoor unit.

This procedure is carried out to ensure there is no remaining refrigerant or other gases (nitrogen, etc.) in the repaired outdoor unit and tubing.

5-1. Evacuating Repaired Outdoor Unit

(1) Check that each service valve of the gas line, and the liquid line in the outdoor unit are fully closed.
* If the AP pins (CN46) on the outdoor control PCB have already been short-circuited, steps (2) and (5) are not necessary.

(2) Turn off power to the outdoor unit to be evacuated.

(3) Connect the manifold gauge valves to the high- and low-pressure sensor outlets of the outdoor unit.

(4) Connect the manifold gauge valves to the vacuum pump.

(5) Short-circuit the AP pins on the outdoor control PCB and turn on power to the repaired outdoor unit.

CAUTION

By short-circuiting the AP pins and turning on power to the outdoor unit, all electronic expansion valves in the outdoor unit are forcibly opened and any remaining nitrogen gas can be recovered. Failure to perform this procedure may result in nitrogen gas remaining in the refrigerant circuit and causing operating problems. Therefore, never skip this step.

(6) Run the vacuum pump and continue evacuation until the vacuum condition falls to less than –14.7 psig (5 Torr).

CAUTION

To ensure proper evacuation, refer to the operating instructions that came with the vacuum pump.

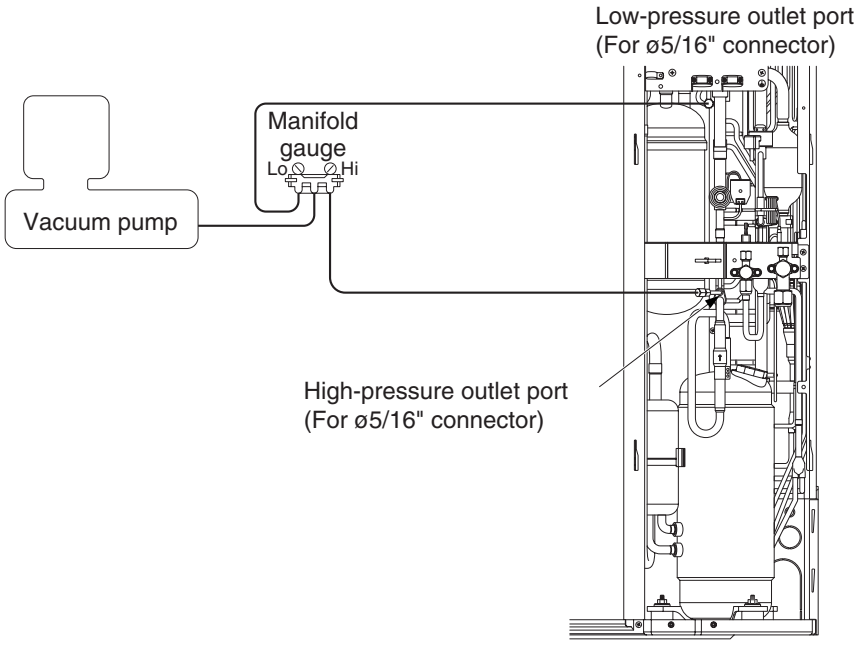


Fig. 2-7

5-2. Evacuating Refrigerant Tubing Between Indoor and Outdoor Units

Refer to the “Installation Instructions” that came with the outdoor unit.

6-1. If Refrigerant Has Already Been Charged to Outdoor Unit

Be sure to use an exclusive oil-charging tank for charging compressor oil. Prior to charging, carry out vacuum of the tank and take care that no air (in the form of bubbles) is permitted to enter the tank.

The oil charging procedures are given below.

* The receiver tank used for maintenance may be used as an exclusive oil-charging tank.

When installing the oil-charging tank to the refrigerant system to serve as a safety bypass circuit for refrigerant, connect it to the gas line service port carefully to avoid releasing refrigerant into the atmosphere.

Perform oil charging work carefully so that no liquid refrigerant enters the charging tank.

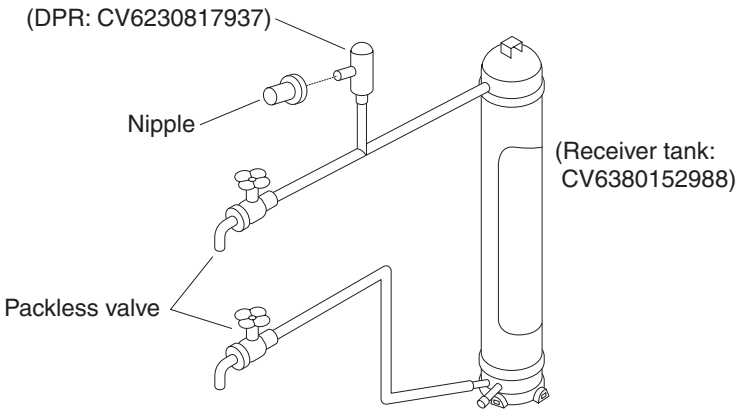


Fig. 2-8

(1) Evacuation drying in oil-charging tank

With the bottom side valve fully closed, open the upper side valve and connect it to the vacuum pump via the manifold gauge valves as shown below. Run the vacuum pump and evacuate the tank until the pressure falls to below –14.7 psig (5 Torr) for the evacuation drying. After the evacuation drying is finished, fully close the upper valve. Next, fully close the manifold gauge valves and stop the vacuum pump.

To ensure proper evacuation, refer to the operating instructions that came with the vacuum pump.

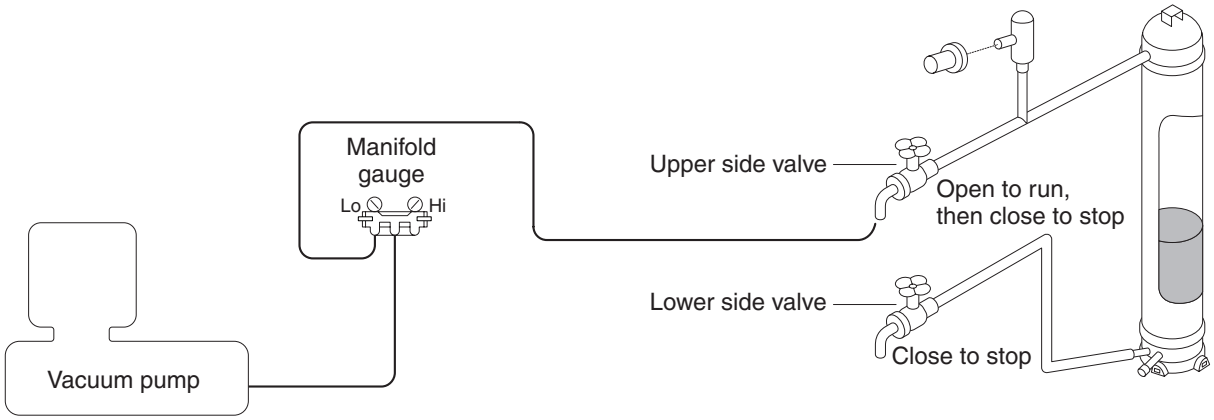


Fig. 2-9

(2) Charging compressor oil into oil-charging tank

Connect a piece of pipe to the lower valve and then insert the other end deeply into the bottom of the oil container. Make sure you avoid letting any air be sucked into the tube. Next, run the vacuum pump and open the manifold gauge valves, open the upper and lower valves to begin charging oil into the charging tank. After the tank is charged, close the lower side valve and draw off any moisture that may have accumulated.

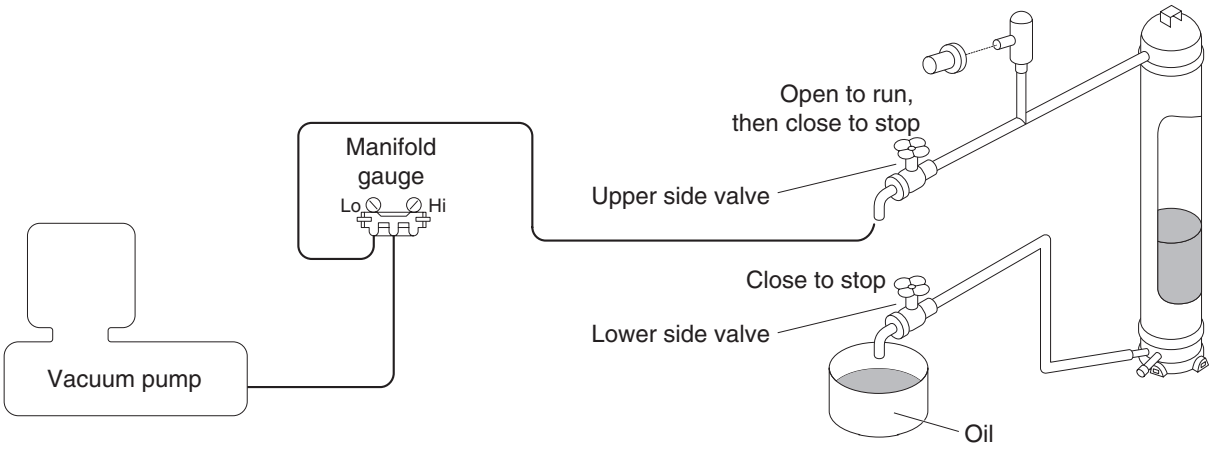


Fig. 2-10

(3) Charging compressor oil into outdoor unit
Connect the lower valve to the low-pressure sensor outlet (with Schrader-type, push-to-release valve) in the outdoor unit to be oil-charged, and then connect the high-pressure sensor outlet (with push-to-release valve) to the upper valve via the manifold gauge valves (at Hi-pressure gauge side). In addition, connect the gas line service port (with push-to-release valve) to the DPR (Discharge Pressure Regulator). Carry out the connection work quickly to avoid letting air enter.

CAUTION

The hoses may be subject to internal pressure from the refrigerant inside the outdoor unit. A Schrader-type, push-to-release valve is provided at each connection port. Since the DPR valve opens at pressures of 362.6 psi and above, be sure to connect the DPR to the gas line service port (low-pressure side).

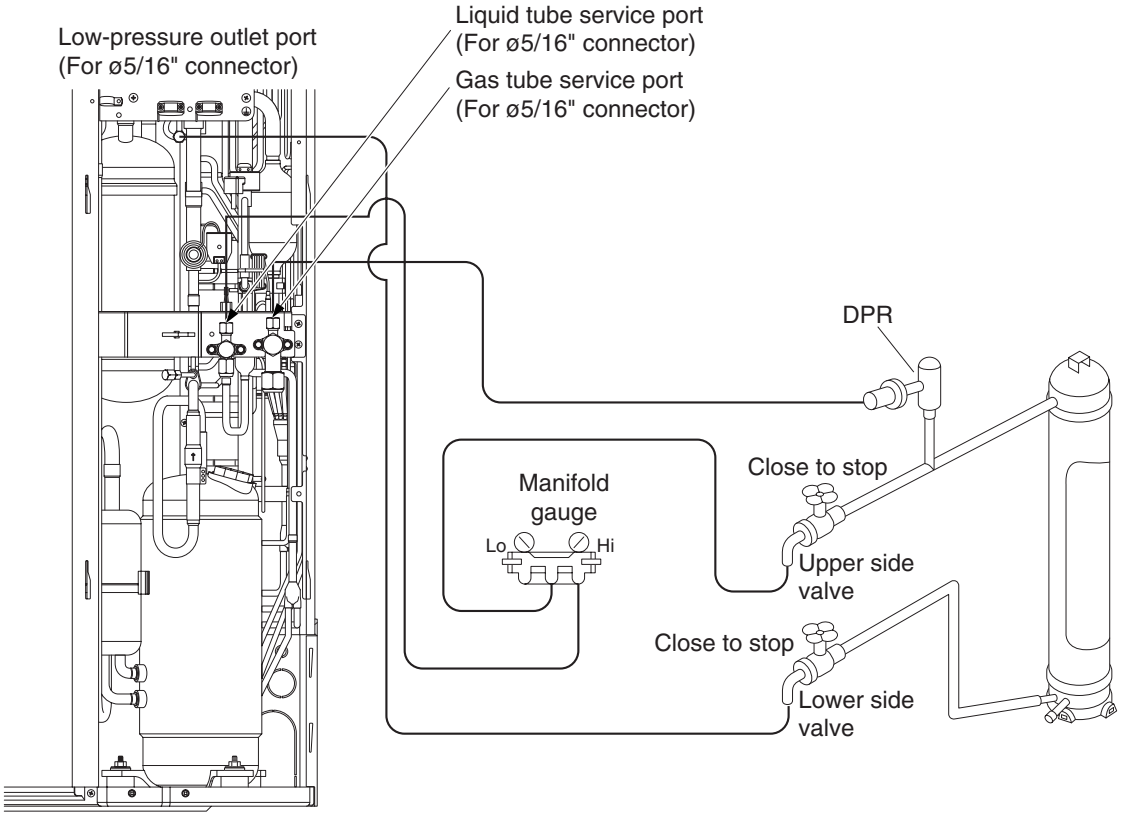


Fig. 2-11

Next, start Cooling mode operation of the outdoor unit to be oil-charged. When cooling operation reaches a stable condition, open each valve corresponding to these procedures in the order given:

Procedure 1: Open the Hi-side gauge manifold valve

Procedure 2: Open the upper valve

Procedure 3: Open the lower valve

Using this series of procedures, the oil in the oil-charging tank will be pushed up by the pressurized refrigerant under cooling operation. This charges the oil into the outdoor unit through the low-pressure outlet port. If you wish, you can periodically close the upper valve of the oil-charging tank and shake the tank gently to check the approximate amount of remaining oil inside.

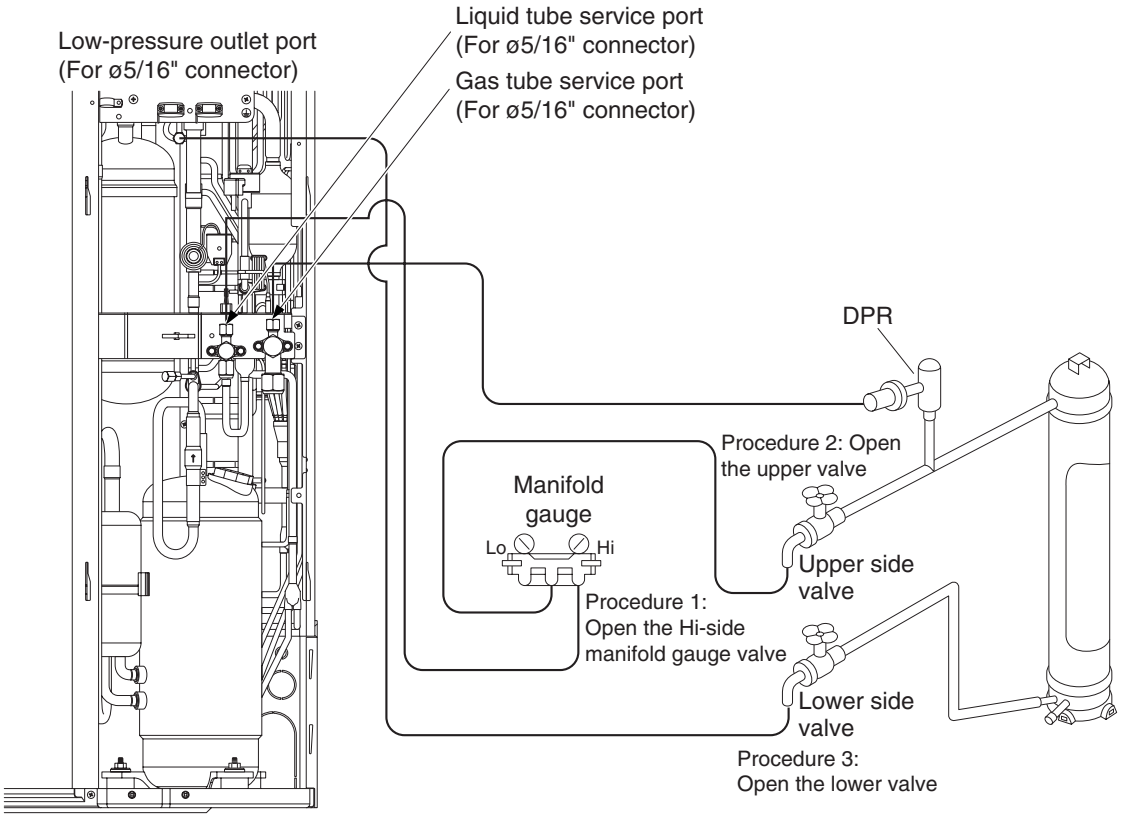


Fig. 2-12

To terminate the oil charging work, do as follows:

First, close the Hi-side manifold gauge valve and wait momentarily until the Lo-pressure gauge reading shows stable indication. Next, fully close the Hi-side manifold gauge valve (Procedure 1) and the lower valve (Procedure 3) from the oil-charging tank, in that order. (The above steps are used to equalize the internal pressure at the same level as the low-pressure sensor outlet and letting refrigerant evaporate in the tank.)

Finally, connect the refrigerant recovery unit to the Lo-gauge side, shut down all indoor and outdoor units, and then recover the remaining refrigerant in the oil-charging tank, manifold gauge valves, and connecting hoses. Perform these procedures quickly and securely so that no air can enter. After, charge the necessary amount of new refrigerant by referring to the “Installation Instructions” that came with the outdoor unit.

NOTE

To determine the completion of refrigerant recovery, follow the instructions that came with the refrigerant recovery unit.

6-2. If Outdoor Unit Has Not Been Charged with Refrigerant

When a compressor has been replaced or in any other case where the outdoor unit has not been charged with refrigerant, first charge with refrigerant then follow the instructions in "6-1. If Refrigerant Has Already Been Charged to Outdoor Unit" and charge with oil.

Or, alternatively, follow the procedure below.

(1) Connect a tube to the low-pressure outlet port on the outdoor unit to be charged with oil. Insert the other end of the tube into the oil container.

(2) Follow the instructions in "5. Evacuating System," and apply vacuum to the outdoor unit to be charged with oil. When this is done, oil is charged into the outdoor unit through the oil outlet port.

(3) When the unit has been charged with the designated amount of oil, stop the vacuum pump.

CAUTION

Because oil absorbs moisture readily, this work must be completed quickly.

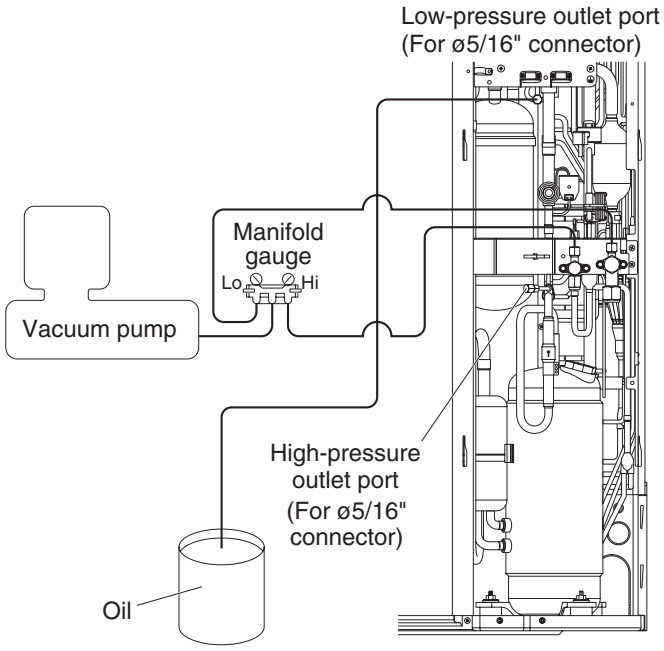


Fig. 2-13

2

6-3. Charging Additional Compressor Oil (After Replacing Compressor)

Model name	Compressor model	Q'ty	Pre-charged amount of oil (gal)
U-36LE1U6/U-52LE1U6 U-36LE1U6E/U-52LE1U6E	C-9RVN273H0W (Inverter-controlled rotary compressor)	1	0.50

The rated amount of oil is pre-charged in the compressors as given below.

When replacing a faulty compressor, be sure to first measure the amount of remaining oil in the compressor. Charge additional new oil equal to the difference in the remaining oil and the rated amount as listed above.

For example: Type of replaced compressor: C-9RVN273H0W
Remaining oil in the removed compressor: 0.55 gal

Additional oil to be charged: 0.55 gal (remaining oil) – 0.50 gal (rated oil amount) = 0.05 gal

* If the result is a negative amount (remaining oil is less than the rated amount), it is not necessary to discharge the extra oil from the system.

For the method used for additional oil charging after compressor replacement, refer to "6-1. If Refrigerant Has Already Been Charged to Outdoor Unit."

Required equipment and tools: Jumper wire with clips, adjustable wrench, set of manifold gauge valves, vacuum pump, refrigerant recovery unit, pre-purged refrigerant cylinder for recovery, and hex wrench (4 mm for liquid tube and 5 mm for gas tube).

This procedure is used to move refrigerant of the faulty outdoor unit (except compressor) into indoor units, and refrigerant tubing.

(1) Connect the manifold gauge valves at the Lo-side to the low-pressure sensor outlet of the outdoor unit to be repaired. Also connect the refrigerant recovery cylinder to any one of the normal outdoor units at the liquid line service port (Schrader type, with push-to-release valve). Perform the connection work quickly so that no air is allowed to enter.

* Connecting the refrigerant recovery cylinder is done to prevent pressure from rising excessively during the backup operation by recovering the refrigerant from the outdoor unit to be repaired.
(Measure the weight of the refrigerant and cylinder itself beforehand and provide sufficient safety measures, such as installing a high-pressure cutout in the circuit.)

The hoses may be subject to internal pressure from the refrigerant inside the outdoor unit. Check that the manifold gauge valves are fully closed beforehand. A Schrader-type, push-to-release valve is provided at each connection port.

(2) Short-circuit the TEST pin (CN44) on the outdoor control PCB of the main unit.

(3) After operating the unit for a while, judge whether it is running in Cooling or Heating mode by touching the gas line cautiously with your fingers. If it is running in Cooling mode, follow the instructions given in (4) through (6).

* The gas line reaches a low temperature (under 68°F) during cooling operation, and a high temperature (over 140°F) during heating operation.

Be careful when testing the temperature of the gas line with your fingers, because the tubing becomes very hot (about 140°F) when Heating mode is used.

(4) If the unit is in Cooling mode, temporarily release the short-circuit across the test run pins on the outdoor control PCB of the unit. Then, short-circuit the STOP pin (CN49) to stop operation of the unit.

(5) Short-circuit the MODE pin (CN50) on the outdoor control PCB of the main unit.

* The 4-way valve will not change at this moment; rather, it changes just before start of operation. (It is difficult to confirm the change by listening for the sound.)

(6) Short-circuit the TEST pin (CN44) on the outdoor control PCB of the unit. Let the unit operate for a while, then check if it is in Heating mode by cautiously touching the gas line.

(7) Slowly close the liquid line service valve of the outdoor unit to be repaired.

(8) When the low-pressure gauge reading shows 72.5 psi or less, pull out the EXL2 connector (3P) (YEL) (CN037) on the control PCB of the outdoor unit to be repaired and then fully close the gas line service valve immediately.

* By pulling out the EXL2 connector, all outdoor units stop immediately.

While closing the valve, the outdoor unit may suddenly stop. This is because a protective function, such as for discharge temperature, is working. In this case also, fully close the gas line service valve immediately.

(9) Connect the high-pressure sensor outlet of the outdoor unit to be repaired to the manifold gauge valves at the Hi-side. Also connect the manifold gauge valves to the refrigerant recovery unit. Perform the connection work quickly so that no air is allowed to enter.

(10) Open both Hi- and Lo-side valves on the manifold gauge valves, and recover the refrigerant remaining in the outdoor unit. After that, measure the amount of recovered refrigerant.

NOTE

To determine the completion of refrigerant recovery, follow the instructions that came with the refrigerant recovery unit.

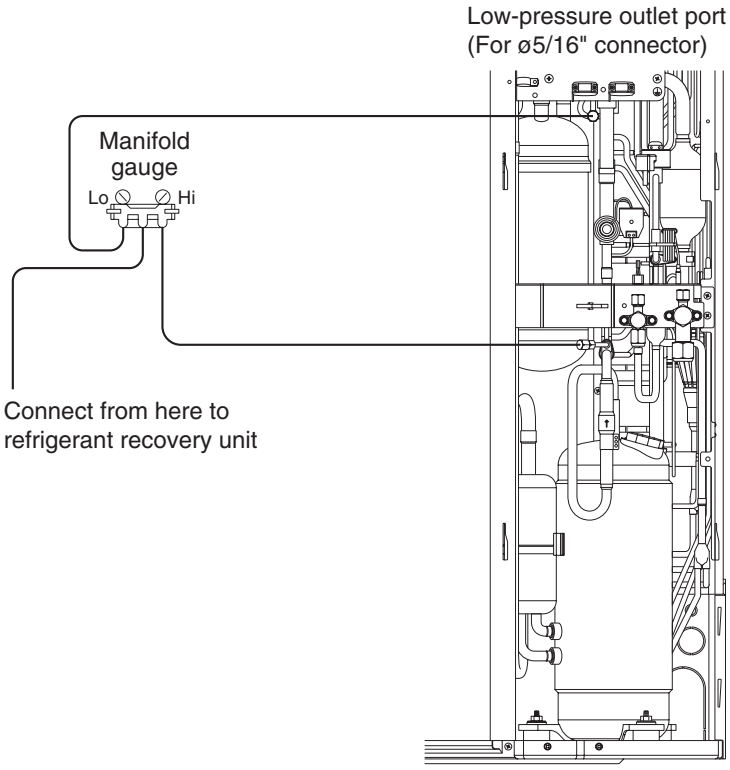


Fig. 2-14

8-1. Compressor Trouble Diagnosis and Check Methods

Generally, compressor failures can be classified into the following categories.

(1) Mechanical trouble → (A) Locking (intrusion of foreign objects, galling, etc.)
(B) Pressure rise failure (damaged valve, seal, bearing, or other component)
(C) Noise (damaged stator, rotor, valve, or other component)

(2) Electrical trouble → (A) Coil burning
(B) Open circuit
(C) Insulation failure
(D) Short circuit

Failure diagnosis is based on the following remote controller displays: [H01], [H02], [H03] (Compressor : right side when viewed from front). A judgment is made based on factors that include the following: coil resistance (varies depending on the compressor), insulation resistance, current, leakage breaker operation, oil and refrigerant fouling, odor, pressure, and noise.

Reference: Insulation resistance (Use a DC 500 V insulation resistance meter and measure the insulation resistance between the electrified and non-electrified parts.)

(a) Motor → Min. 300 MΩ
(b) Compressor → Min. 100 MΩ (servicing part)
(c) Unit → Min. 10 MΩ (This is due to the presence of refrigerant, which decreases the insulation resistance.)

* Minimum insulation resistance as required by generally accepted requirements is 1 MΩ.

Reference: Symptoms of motor burning

1. Ground fault results in breaker operation.
2. Short circuit results in different coil resistance at different phases.
3. Open circuit

8-2. Compressor Replacement

(1) Follow the instructions in “8-4. Replacing the Compressor” and replace compressor in the failed unit.

(2) Fully close the high- and low-pressure gauge valves on the manifold gauge, then stop the vacuum pump.

(3) Disconnect the manifold gauge from the vacuum pump. Connect the manifold gauge to the refrigerant cylinder. At this time, be careful that air does not enter the refrigerant tubing.

Do not use the recovered refrigerant. Use a refrigerant cylinder that contains new refrigerant.

(4) Open the valve on the refrigerant cylinder. When charging with the amount of recovered refrigerant is completed, or when charging with the amount of recovered refrigerant is not completed but no more refrigerant will enter the unit, first turn the power OFF at the repaired outdoor unit, then remove the short circuit at the AP pin (CN46). Then fully open all valves on the gas tube, and liquid tube.

(5) If charging with the amount of recovered refrigerant was not possible, fully close the high-pressure gauge valve on the manifold gauge. Then, while the unit is operating in Cooling mode, open the low-pressure gauge valve on the manifold gauge and charge with the designated amount of refrigerant.

When charging with liquid refrigerant, add refrigerant a little at a time in order to prevent liquid back-flow.

(6) Follow the instructions in “6. Charging Compressor Oil” and charge with the necessary amount of oil.

(7) Remove the manifold gauge.

CAUTION

The connecting port includes a Schrader-type, push-to-release valve. When disconnecting the hose, pressure will be applied from the refrigerant in the outdoor unit.

(8) Follow the instructions in "8-3. Dry Core Cleaning" and perform dry core cleaning of the outdoor unit that failed.

8-3. Dry Core Cleaning

If burning or other failures occur repeatedly at compressor, in many cases the cause is acid, sludge, carbon, or other substances that remain in the refrigeration cycle as the result of insufficient cleaning.
If, when the oil is inspected, there is an outdoor unit where the oil color phase is 4.0 or higher, or where a sharp odor is present, carry out all steps below to perform dry core cleaning.

* The operating pressure is approximately 1.5 times higher than with R22 or R407C. Therefore use R410A dry cores.

(1) Refer to "Refrigerant recovery procedures (B): for indoor unit with no ball valve" under "3-2. Refrigerant Recovery Procedures (Indoor Unit)." Perform pump-down of the refrigerant from all indoor units and inter-unit tubing to the outdoor unit side.

(2) Cut the liquid tube at all outdoor units where dry cores will be attached, then attach the dry cores and ball valves as shown in Fig. 2-15.

(3) Operate outdoor unit (in either Heating or Cooling mode).

(4) Fully close the liquid tube valve and ball valve at the outdoor unit where dry cores will be attached.

(5) Stop operation of outdoor unit.

(6) Connect a refrigerant recovery device to the liquid tube service port (Schrader-type valve) on the outdoor unit where dry cores will be attached. Recover the refrigerant that is in the tubing. At this time, be careful that air does not enter the tubing.

CAUTION

The connecting port includes a Schrader-type, push-to-release valve. When connecting the hose, internal pressure will be applied from the remaining refrigerant in the inter-unit tubing. To determine when refrigerant recovery has been completed, follow the instructions that came with the refrigerant recovery device.

(7) As shown in Fig. 2-15, disconnect the tube that runs from the liquid tube valve to the ball valve on the outdoor unit where dry cores will be attached. Then attach the dry cores.

(8) At all outdoor units where dry cores are attached, pressurize with 362.6 psi of nitrogen from the liquid tube service port and check for leaks.

(9) After draining all nitrogen from the tubing, apply vacuum from the liquid tube service port to the outdoor unit where dry cores are attached until the pressure is –14.7 psig (5 Torr) or less.

(10) Fully open the liquid tube valve and ball valve on the outdoor unit where dry cores are attached.

(11) Operate the outdoor unit for approximately 3 hours (in either Heating or Cooling mode).

(12) Follow the above procedure, and replace all dry cores with new dry cores.

(13) Operate all outdoor units for approximately 20 minutes (in either Heating or Cooling mode).

(14) Follow the instructions in "2. Discharging Oil in Compressor" and drain a small amount of the oil from the oil separators of all outdoor units where dry cores are attached. Check the color phase, odor, and other characteristics.

(15) If the results show that dry core cleaning is still necessary (for example, a color phase of 4.0 or higher), return to Step 13 and repeat until the results are normal (including a color phase of 3.5 or less).

CAUTION

Perform another dry core replacement after approximately 30 hours of system operation.

(16) Fully close the liquid tube valve and ball valve on the outdoor unit where dry cores are attached.

(17) Connect a refrigerant recovery device to the liquid tube service port (Schrader-type valve) on the outdoor unit where dry cores are attached. Recover the refrigerant that is in the tubing. At this time, be careful that air does not enter the tubing.

(18) Remove dry cores. Connect the tube that runs from the liquid tube valve to the ball valve.

(19) At the outdoor unit where dry cores were removed, pressurize with 362.6 psi of nitrogen from the liquid tube service port and check for leaks.

(20) After draining all nitrogen from the tubing, apply vacuum to the outdoor unit where dry cores were removed until the pressure is –14.7 psig (5 Torr) or less using the liquid tube service port.

(21) Refer to the “Installation Instructions”. Charge with an amount of refrigerant equal to the amount that was recovered.

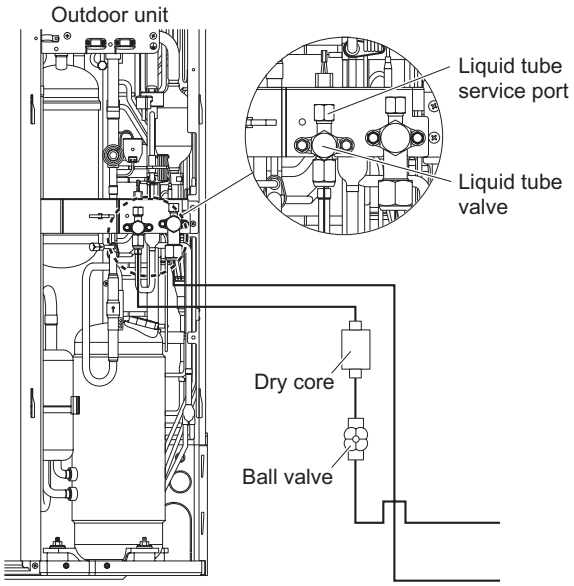


Fig. 2-15

8-4. Replacing the Compressor

When removing and installing compressors, use sufficient caution to ensure that water or other substances do not enter the refrigerant tubing system.

8-4-1. Replacing the compressor

(A) Replacing the inverter compressor (Compressor 1 on remote controller alarm display)

■ Removal

(1) Connect a manifold gauge to the high- and low-pressure outlet ports at the outdoor unit where the compressor will be replaced. Connect the manifold gauge to a nitrogen cylinder and perform nitrogen replacement.

(2) Follow the procedure for removing panels, and remove the front panel, the right lower panel, and the electrical component box cover. (Fig. 2-16)

(3) Follow the refrigerant work procedure and recover the refrigerant.

(4) Remove the acoustic material that surrounds the compressor (3 layers).

(5) Remove the cap from the compressor terminal plate. Disconnect the power terminal and internal terminal.

(6) Remove the crankcase heater.
Remove the 3 flange washers that are attached to the compressor legs as shown in Fig. 2-17.

(7) Prepare to disconnect the 2 welded locations shown in Fig. 2-17. Protect the sensors and the surrounding plates, rubber, lead wires, clamps, and other items.

(8) Disconnect the 2 welded locations shown in Fig. 2-17.

(9) Tilt the compressor toward you slightly. Lift it off of the bolt at the rear of the compressor, then pull the compressor toward you.

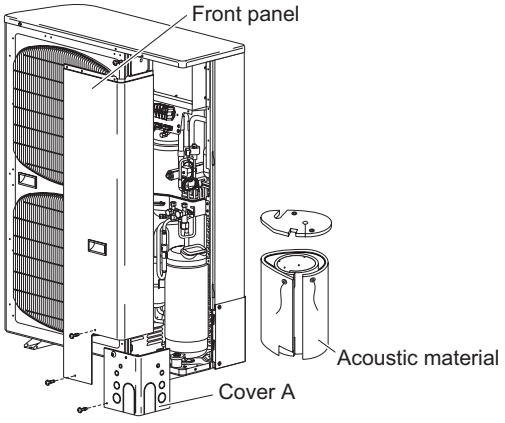


Fig. 2-16

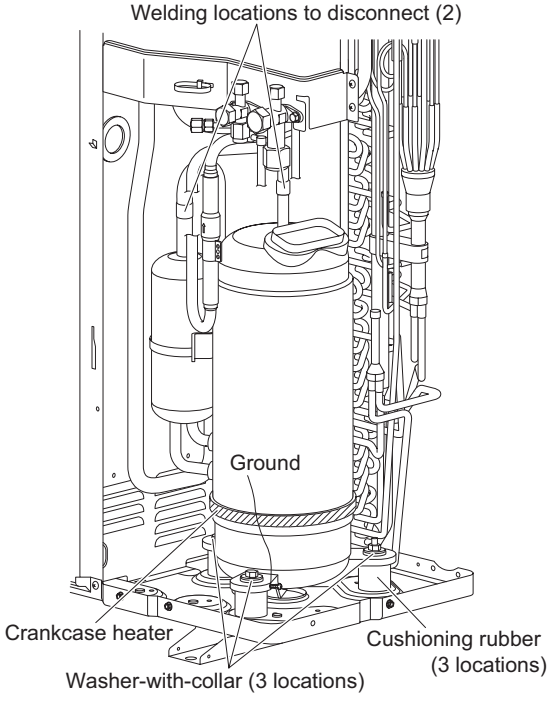


Fig. 2-17

■ **Installation**

(1) Prepare for installation.
- Remove the rubber stopper and tube cap (welded) from the new compressor.

(2) Install the crankcase heater onto the compressor.

(3) Place the cushioning rubber in the designated positions on the compressor. (There are 3 pieces for an inverter compressor.)

(4) Set the new compressor into the unit.

(5) Shape the tubes and insert them at the 2 welding locations.

(6) Use nitrogen to replace the air inside the compressor. Perform brazing at all parts.

(7) Increase the pressure to the nitrogen airtightness test pressure of 362.6 psi. Check that no leakage occurs.

(8) Re-install all components that were removed. Re-install the electrical component box in the same position as it was before.

(9) After the airtightness test is completed, apply vacuum until a pressure of –14.7 psig (5 Torr) or less is reached at the indoor and outdoor units and in the tubing.

(10) After applying vacuum, charge with refrigerant.
For the refrigerant charging methods, refer to "Installation Instructions."
Charge with the total of the "refrigerant amount at time of shipment" plus the "additional charge amount." (Listed on the nameplate and description label.)
- Be sure to perform refrigerant charge using liquid refrigerant.

(11) Never use any refrigerant other than R410A.

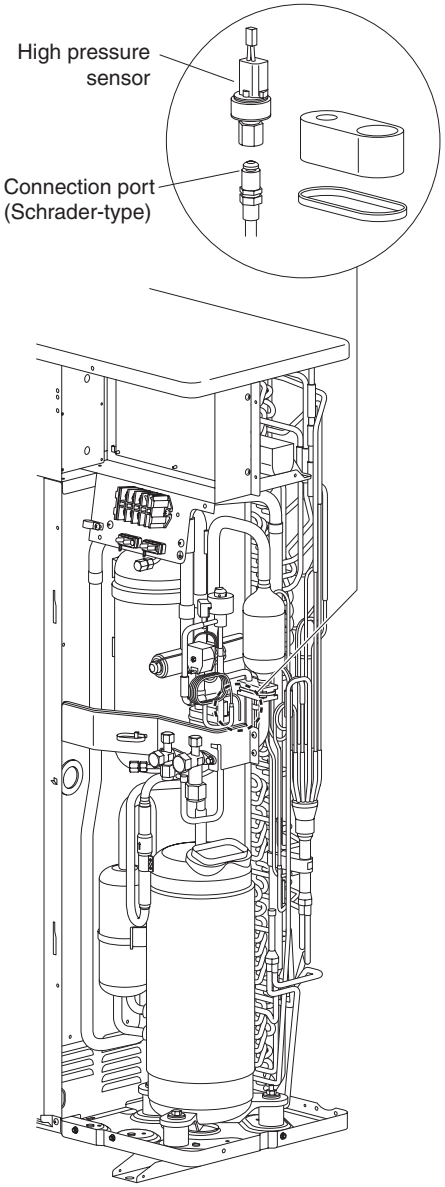


Fig. 2-18

9. High Pressure Sensor

The high pressure sensor connection port on the outdoor unit includes a Schrader-type, push-to-release valve. It is not necessary to recover the refrigerant when removing and installing the sensor.

9-1. Removing the High Pressure Sensor

(1) Refer to "1. Removing Panels" and remove the front panel.

(2) Disconnect the high pressure sensor connector (3P - BLK) from terminal CN29 on the outdoor unit control PCB of the outdoor unit where the high pressure sensor will be removed.

(3) Use 2 adjustable wrenches in combination to remove the high pressure sensor.

CAUTION

The high pressure sensor connection port on the outdoor unit includes a Schrader-type valve. When removing the high pressure sensor, internal pressure will be applied from the refrigerant in the outdoor unit.

9-2. Installing the High Pressure Sensor

(1) Use 2 adjustable wrenches in combination to install the high pressure sensor.

3. OUTDOOR UNIT MAINTENANCE REMOTE CONTROLLER

1. Overview **3**-2
2. Functions **3**-3
3. Ordinary Display Controls and Functions **3**-4
4. Monitoring Operations **3**-9
5. Outdoor Unit Alarm History Monitor **3**-11
6. Mode Settings **3**-12

OUTDOOR UNIT MAINTENANCE REMOTE CONTROLLER (CZ-RTC2) for MINI VRF

■ About the outdoor unit maintenance remote controller

The outdoor unit utilizes nonvolatile memory (EEPROM) on its PCB. This allows EEPROM data to replace the setting switches that were present on previous PCBs. The outdoor unit maintenance remote controller is used to set and change these EEPROM data.
In addition to setting and checking the outdoor unit EEPROM data, this remote controller can also be used to monitor the outdoor unit alarm history, monitor the various indoor and outdoor temperatures, and check the indoor unit connection status (number of units, operating mode, etc.).

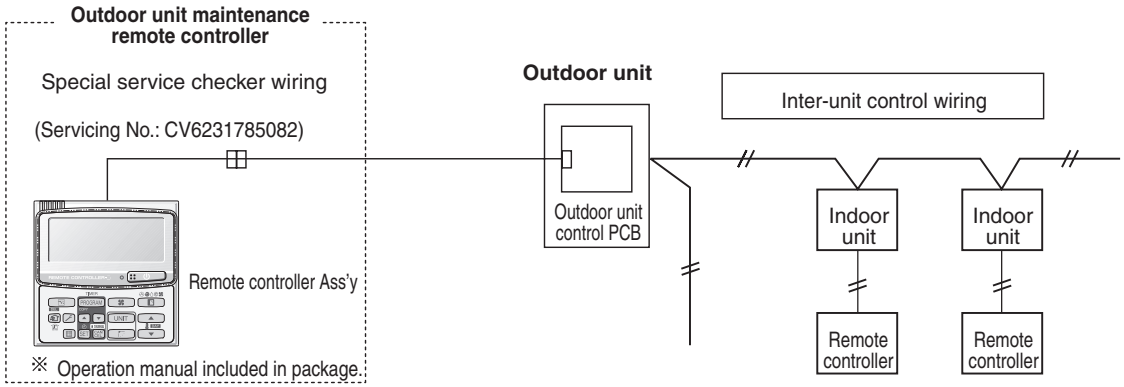
[Service Checker Section]

CZ-RTC2

NOTE

Outdoor unit maintenance remote controller does not function as an ordinary remote controller. It is therefore only used for test runs and during servicing.

System diagram



- The special service checker wiring is required in order to connect the outdoor unit maintenance remote controller to the outdoor unit PCB.
- Ordinary remote controllers or other controller are still required for the indoor units, even when the outdoor unit maintenance remote controller is connected.

3

■ **Functions on the ordinary display**

(1) Functions: Button operations can be used to perform the following functions.
- Start/stop of all indoor units
- Switching between cooling and heating
- Test run of all indoor units
- Double-speed operation of indoor units (Do not use for actual operation. Doing so may damage the devices.)

(2) Display: The following can be displayed.
- Alarm details display
- No. of indoor/outdoor units
- Unit Nos. of connected indoor/outdoor units
- Indoor/outdoor unit operating status (blinks when an alarm occurs)
- Indoor unit thermostat ON
- Display of individual outdoor unit alarms
- Total operating time of outdoor unit compressors
- Oil level of the outdoor unit oil sensor
- Total outdoor unit power ON time
- Outdoor unit microcomputer version, other information

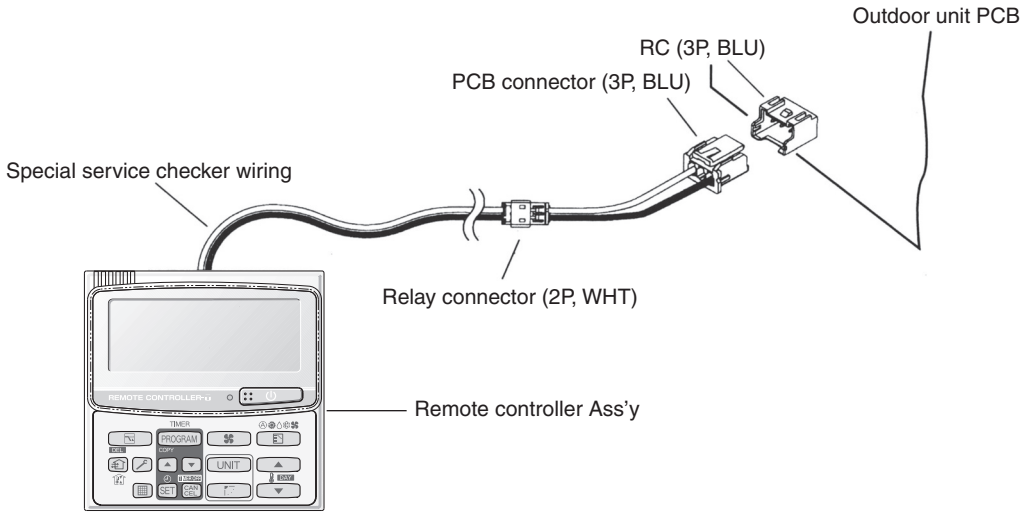
■ **Temperature monitor**
- Displays the indoor/outdoor unit sensor temperatures.

■ **Outdoor unit alarm history monitor**
- Displays the outdoor unit alarm history.

■ **Mode settings**
- Setting mode 1 and setting mode 2 are used to make the outdoor EEPROM setting.

■ **Functions on the ordinary display**

- Connect the special service checker wiring to the outdoor unit PCB.
  The connection is shown in the figure below.



- If the communications line in the inter-unit control wiring is connected, it can be left as-is.
- In case of an independent outdoor unit (1 maintenance remote controller connected to 1 outdoor unit, automatic address setting for indoor units not completed), both setting mode 1 and setting mode 2 can be used.
- The overall system status for that refrigerant system is displayed.

- **All units start/stop (Fig. 3-1)**

<Operation>

The (ON/OFF operation) button can be used to start and stop all the indoor units.

- The LED illuminates if any indoor units is operating.
- The LED blinks if an alarm at any of the operating indoor units occurs.

Fig. 3-1

- **Cooling/heating change (Fig. 3-1)**

<Operation>

The (MODE) button can be used to change between heating and cooling operation.

- The display indicates the operating mode of the indoor unit with the lowest unit No.

- **All units test run (Fig. 3-2)**

<Operation>

The (CHECK) button can be used to start and stop a test run for all indoor units.

- Press and hold for 4 seconds to turn ON.
  During the test run "TEST" is displayed.
- The status of test runs performed from the indoor unit remote controller is not displayed on the outdoor unit maintenance remote controller.

Fig. 3-2

- **Double-speed (Fig. 3-3)**
  - Do not use for actual operation.
    (Doing so may damage the devices.)

<Operation>

The timer button can be used to change between double-speed and normal operation.

- During double-speed operation, the SLEEPING MODE mark is displayed.

Fig. 3-3

■ **Display (functions)**

• Use the temperature setting ▲ and ▼ buttons to change the item code.

Item code	Item	Remarks
00	Outdoor unit alarm	Alarm code display
01	No. of connected indoor units	Quantity
02	Unit Nos. of connected indoor unit	7-segment display
03	Operating status of indoor unit	7-segment display
04	Thermostat ON status of indoor unit	7-segment display
05		
06		
07	Operating status of outdoor unit compressor	7-segment display
08		
09		
10	Compressor 1 operating time	0 – 99999999 hrs
11		
12		
13		
14		
15		
16	Outdoor unit power ON time	0 – 99999999 hrs
17	Compressor 1 operation count	0 – 65535 times
18		
19		
F0	Alarm history 1 (most recent)	
F1	Alarm history 2	
F2	Alarm history 3	
F3	Alarm history 4	
F4	Alarm history 5	
F5	Alarm history 6	
F6	Alarm history 7	
F7	Alarm history 8 (oldest)	
FE	Firmware version	Display the version No. × 100.
FF	Program version	Display the version No. × 100.

■ **XX-YY R.C. (Fig. 3-4)**

Displays the outdoor unit sub-bus address which is currently selected.
XX = Outdoor system address on main bus line (1 – 30)
YY = Outdoor unit sub-bus address.
"1" appears when there is only 1 outdoor unit.

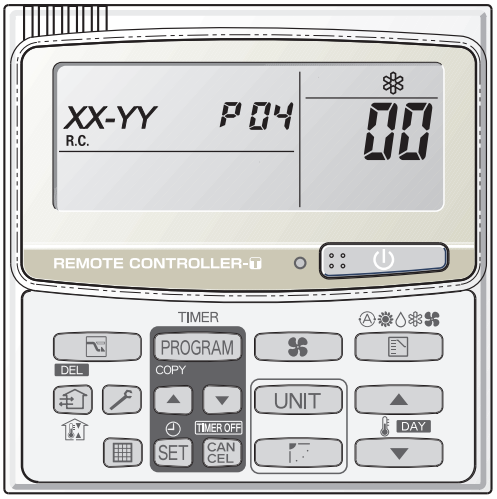
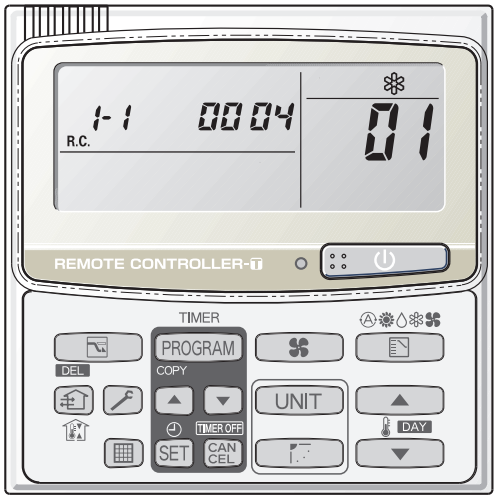


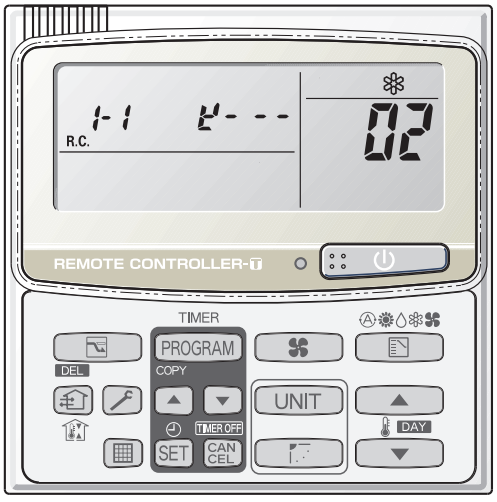
Fig. 3-4

<Sample displays>



01: <No. of connected indoor units>
4 units connected

Fig. 3-5



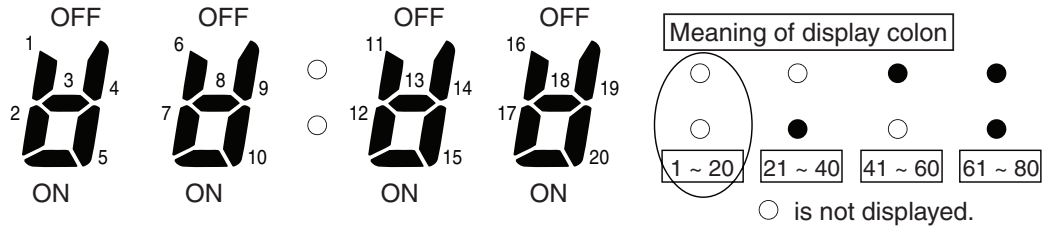
02: <Unit Nos. 1, 2, 3, and 4 are connected>

Fig. 3-6

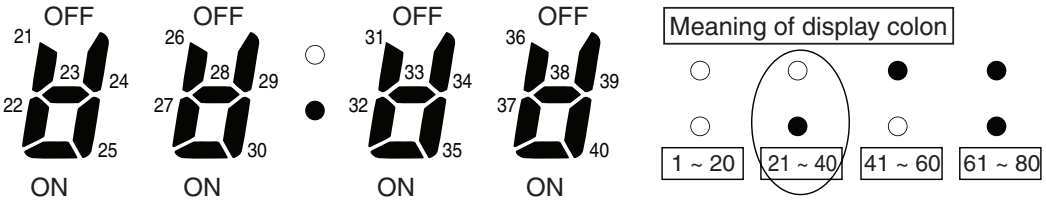
■ **Concerning the 7-segment, 4-digit display remote controller timer display**

The unit Nos. of connected units are indicated by four 7-segment digits (88:88) and a colon.

- **Display of unit Nos. 1 – 20**



- **Display of unit Nos. 21 – 40**



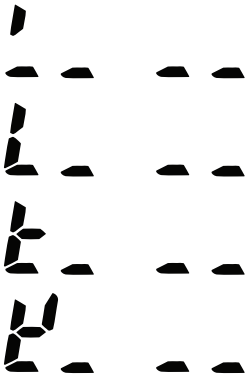
- The meaning of the colon changes in the same way to indicate unit Nos. up to 80.
- Sample displays of the connected indoor unit Nos.:

  • Display of unit No. 1

  • Display of unit Nos. 1 and 2

  • Display of unit Nos. 1, 2, and 3

  • Display of unit Nos. 1, 2, 3, and 4

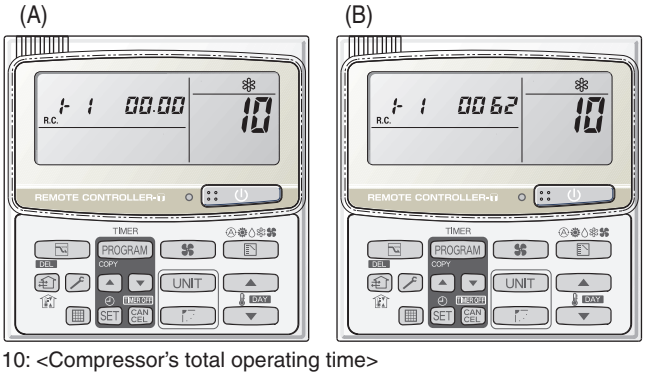


NOTE

The change of the colon display (between unit Nos. 1-20 to unit Nos. 21-40) occurs automatically every 10 seconds. (However the display does not change if there are no higher-number units connected.) To change the display to the higher-number units before 10 seconds have passed, press the (FLAP) button.

■ **The total compressor operating time is displayed (in 1-hour units) using 8 digits.**

- When the first 4 digits are displayed, the bottom dot of the colon is illuminated. (Figure (A))
- When the last 4 digits are displayed, the colon dot is OFF. (Figure (B))
- The display of the first 4 digits and last 4 digits changes automatically after 10 seconds. The display can also be changed by pressing the (FLAP) button.



10: <Compressor's total operating time>
(A) and (B) are displayed alternately.
(The example here (0000, 0062) indicates 62 hours.)

NOTE

With the outdoor unit maintenance remote controller (when connected to the outdoor unit), the unit remote controller check functions will not operate.

4. Monitoring Operations

Display the indoor unit and outdoor unit sensor temperatures.

<Operating procedure>

① Press and hold the (CHECK) button and CANCEL buttons simultaneously for 4 seconds or longer to engage temperature monitor mode.

During temperature monitoring, displays.

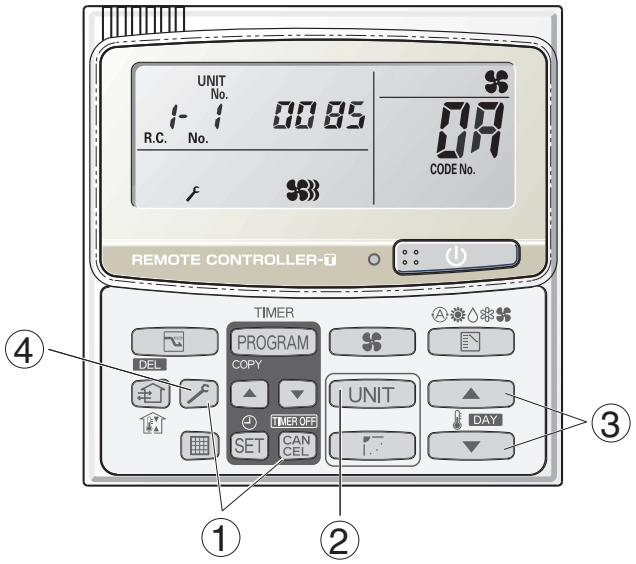
(The display and operations are the same as for monitor mode using the indoor unit remote controller.)

② Press the UNIT button and select the indoor unit to monitor.

③ Press the temperature setting ▲ and ▼ buttons and select the item code of the temperature to monitor.

The unit No. of the selected indoor unit, and the temperature data, are displayed.

④ To end monitoring, press the (CHECK) button. The display returns to the normal display.



NOTE The display does not blink.

3

■ **Display of unit No. 1**

DN	Description	Remarks	
02	Intake temp.	°F	
03	E1	°F	
04	E2	°F	
05	E3	°F	**Indoor unit**
06	Discharge temp.	°F	
07	Discharge temp. setting	°F	
08	Indoor unit electronic control valve position	STEP	
0A	Discharge temp. 1	°F	
0b	Not used		
0C	High-pressure sensor temp.	°F	
0d	Heat exchanger gas 1	°F	
0E	Heat exchanger liquid 1	°F	
0F	Not used		
10	Not used		
11	Outdoor air temp.	°F	
12	Not used		
13	Inverter primary current	A	
14	Not used		**Outdoor unit**
15	MOV1 pulse	STEP	
16	Not used		
17	Not used		
18	Not used		
19	Actual operating frequency	Hz	
1A	Not used		
1b	Not used		
1C	Not used		
1d	Not used		
1E	Not used		
1F	Not used		
20	Not used		
21	Not used		
22	Actual operating frequency	Hz	

NOTE

0A and subsequent items are outdoor unit data.

5. Outdoor Unit Alarm History Monitor

- Displays outdoor unit alarms only.
- Check the indoor unit alarm histories separately using the indoor unit remote controllers or other control device.

<Operating procedure>

① Press and hold the (CHECK) button and SET button simultaneously for 4 seconds or longer to engage outdoor unit alarm history mode.

During temperature monitoring, displays.

The display and operations are the same as for the alarm history monitor performed from the indoor unit remote controller. However the “unit No.” display shows the outdoor unit address.

② Press the temperature setting and buttons and select the item code for the alarm history.

The select outdoor unit address, the item code, and the alarm history (alarm data) are displayed.

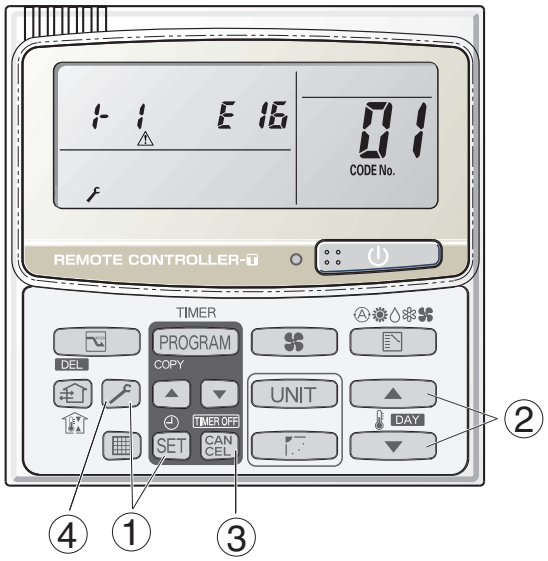
The outdoor unit address is displayed as R.C. XX-YY.
System XX = Outdoor unit system address
R.C. XX = Outdoor unit system address
YY = Outdoor unit sub-bus address

Item codes 01-08 are displayed. 01 indicates the most recent alarm.

The alarm history displays the alarm code. (If no alarm are present, then -- -- is displayed.)

③ To clear the alarm history, press the CANCEL button. (The outdoor unit alarm history will be cleared.)

④ To exit, press the (CHECK) button. The display returns to the normal display.



3

■ Setting mode 1

<Operating procedure>

① Press and hold the (CHECK) button and (VENTILATION) button simultaneously for 4 seconds or longer.

② Press the temperature setting ▲ and ▼ buttons to change the item code. The item codes and setting data are shown in the table below.

③ Press the timer time ▲ and ▼ buttons to change the setting data.

To confirm the changed setting data, press the SET button.

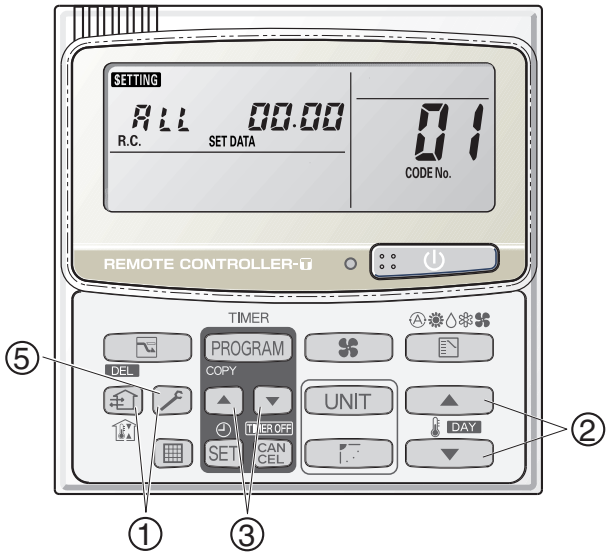
(At this time, "SETTING" stops blinking and remains lit.)

④ During this mode, "SETTING" is displayed, blinking. The outdoor unit address display section displays "ALL," the item code number (DN value in the table), and the setting data (8 digits).

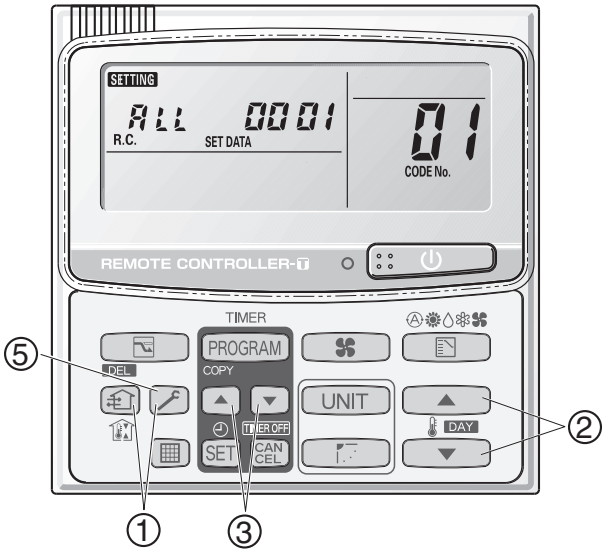
(The setting data is displayed in 8 digits. The display changes between the first 4 digits (Fig. Ⓐ) and the last 4 digits (Fig. Ⓑ). When the first 4 digits are displayed, the bottom dot of the colon is illuminated.)

⑤ To exit the setting mode, press the (CHECK) button.

Ⓐ Display of first 4 digits



Ⓑ Display of last 4 digits



Ⓐ and Ⓑ are displayed alternately.
(Example shows display of 0000 0001.)

DN	Parameter	Description
05	Outdoor unit fan Quiet mode	0 = Disabled 1 = Quiet mode
18	Energy saving mode	0 = None 1 = Discharge temp. control only (Mode 3) 2 = Demand only (Mode 2) 3 = Discharge temp. control + Demand (Mode 1)
19	Energy saving operation plug	0 = Independent 1 = All indoor units linked
1A	Demand 1 current	0 = 0% 1 = 40 … 4 = 70 7 = 100 8 = 120 9 = 140 10 = 160 11 = 200 12 = –1 (no limit)
1b	Demand 2 current	0 = 0% 1 = 40 … 4 = 70 7 = 100 8 = 120 9 = 140 10 = 160 11 = 200 12 = –1 (no limit)

■ Setting mode 2

<Operating procedure>

① Press and hold the (CHECK) button, SET button, and CANCEL button simultaneously for 4 seconds or longer.

② Press the temperature setting ▲ and ▼ buttons to change the item code. The item codes and setting data are shown in the table below.

③ Press the timer time ▲ and ▼ buttons to change the setting data.
To confirm the changed setting data, press the SET button.

(At this time, "SETTING" stops blinking and remains lit.)

④ During this mode, "SETTING" is displayed, blinking. The display shows the set outdoor unit address "System XX-YY" (System XX = System address, YY = Address at outdoor unit sub-bus), item code number (DN value in the table below), and the setting data (8 digits).

(The setting data is displayed in 8 digits. The display changes between the first 4 digits (Fig. Ⓐ) and the last 4 digits (Fig. Ⓑ). When the first 4 digits are displayed, the bottom dot of the colon is lit.)

⑤ To exit setting mode, press the (CHECK) button. Returns to the normal display mode.

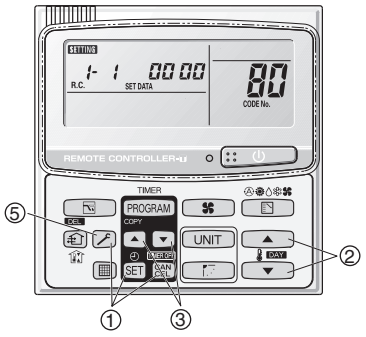
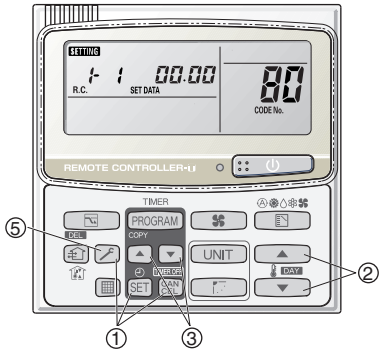
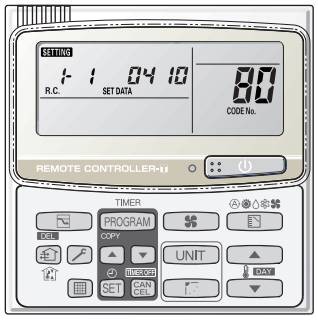


Fig. 3-7

Ⓐ **Display of first 4 digits**



Ⓑ **Display of last 4 digits**



: **<Refrigerant type>** Ⓐ and Ⓑ are displayed alternately. (Example shows 0000 0410 (R410A).)

List of Item Codes

DN	Parameter	Description
81	Outdoor unit capacity	112 = 36 Type 160 = 52 Type

4. REMOTE CONTROLLER FUNCTIONS

1. Simple Settings Function **4**-2
2. Detailed Settings Function **4**-4
3. Remote Controller Servicing Functions **4**-15

- This allows the filter lifetime, operating mode priority change, central control address, and other settings to be made for an individual or group-control indoor unit to which the remote controller used for simple settings is connected.

  When simple settings mode is engaged, operation stops at the individual or group-control indoor unit to which the remote controller for simple settings is connected.

<Procedure>

① Press and hold the [🔧] and [⌂] buttons simultaneously for 4 seconds or longer.

② "SETTING" unit No. "1-1" (or "ALL" in the case of group control), item code "01," and settings data "00XX" are displayed blinking on the remote controller LCD display (Fig. 4-1). At this time, the indoor unit fan (or all indoor unit fans in the case of group control) begins operating.

③ If group control is in effect, press the [UNIT] button and select the address (unit No.) of the indoor unit to set. At this time, the fan at the indoor unit begins operating.

* If unit No. "ALL" is displayed, the same setting will be made for all indoor units.

④ Press the temperature setting [▲] / [▼] buttons to select the item code to change.

⑤ Press the timer time [▲] / [▼] buttons to select the desired setting data.

* For item codes and setting data, refer to the following page.

⑥ Press the [SET] button. (The display stops blinking and remains lit, and setting is completed.)

⑦ Press the [🔧] button to return to normal remote controller display.

[Remote Controller Functions Section]

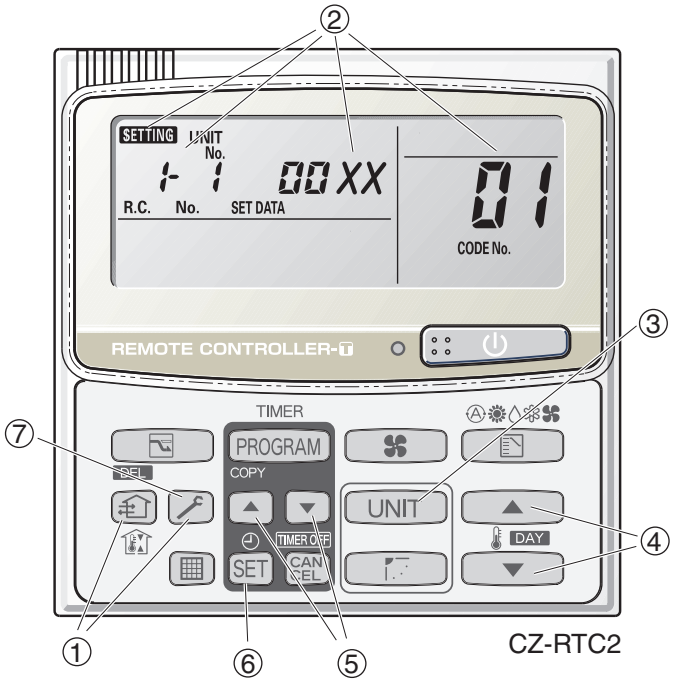


Fig. 4-1

List of Simple Setting Items

Item code	Item	Setting data	
		No.	Description
01	Filter sign ON time (fitlter life time)	0000	Not displayed
		0001	150 hours
		0002	2,500 hours
		0003	5,000 hours
		0004	10,000 hours
		0005	Use the filter clogging sensor.
02	Degree of filter fouling	0000	Standard (setting at time of shipping)
		0001	Highly fouled (Filter sign ON time is reduced to one-half the set time.)
03	Central control address	0001	Central control address 1
		0002	Central control address 2
		0003	Central control address 3
		≀	≀
		0064	Central control address 64
		0099	No central control address set (setting at time of shipping)
04	Operating mode priority change	0000	Normal (setting at time of shipping)
		0001	Priority
05	Fan speed when heating thermostat is OFF		Compressor ON / Compressor OFF
		0000	MED 1 min., LO 3 min. / LO
		0001	MED / LO
		0002	LO / LO
		0004	MED 1 min., LO 3 min. / MED
		0005	MED / MED
		0006	LO / MED
06	Heating intake temperature shift	0000	No shift
		0001	Shifts intake temperature 2°F down.
		0002	Shifts intake temperature 4°F down.
		0003	Shifts intake temperature 6°F down.
		0004	Shifts intake temperature 8°F down.
		0005	Shifts intake temperature 10°F down.
		0006	Shifts intake temperature 12°F down.
07	Electric heater installation	0000	No heater
		0001	Heater installed
08	Humidifying when heater thermostat is OFF	0000	No (setting at time of shipping)
		0001	Yes
0d	Permit/prohibit automatic heating/cooling	0000	Permit
		0001	Prohibit
0F	Cool-only	0000	Normal
		0001	Cool only (Set “1” for item code OD.)

NOTE

- In order to avoid water leakage and damage to the fan, do not set for humidifying when the thermostat is OFF unless a vaporizing humidifier is used.
- Consider the device purpose and type when changing the settings. Incorrect settings may result in malfunction.
- Do not change any setting data that does not appear in this list.

- This allows the system address, indoor unit address, and other settings to be made for the individual or group-control indoor unit to which the remote controller used for detailed settings is connected.

  When detailed settings mode is engaged, operation stops at the individual or group-control indoor unit where the remote controller used for detailed settings is connected. Simple settings items can also be set at this time.

<Procedure>

① Press and hold the [🔧], [SET] and [CANCEL] buttons simultaneously for 4 seconds or longer.

② "SETTING" unit No. "1-1" (or "ALL" in the case of group control), item code "10," and settings data "00XX" are displayed blinking on the remote controller LCD display (Fig. 4-2).

At this time, the indoor unit fan (or all indoor unit fans in the case of group control) begins operating.

③ If group control is in effect, press the [UNIT] button and select the address (unit No.) of the indoor unit to set. At this time, the fan at the indoor unit begins operating.

④ Press the temperature setting [▲] / [▼] buttons to select the item code to change.

⑤ Press the timer time [▲] / [▼] buttons to select the desired setting data.

* For item codes and setting data, refer to the following page.

⑥ Press the [SET] button. (The display stops blinking and remains lit, and setting is completed.)

⑦ Press the [🔧] button to return to normal remote controller display.

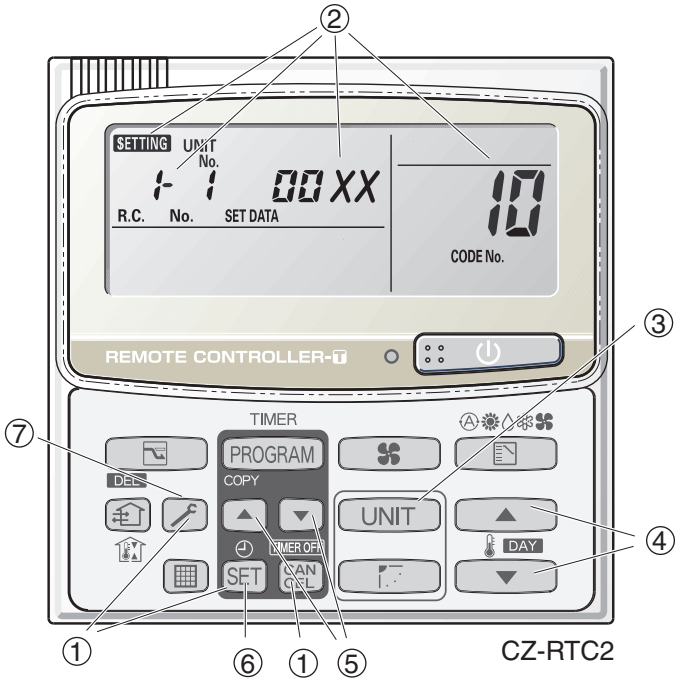


Fig. 4-2

4

List of Detailed Setting Items

Item code	Item	Setting data					
		No.	Description	No.	Description	No.	Description
10	Type	0000	1-Way Air Discharge Semi-Concealed (D1)	0001	4-Way Air Discharge (Mini) Semi-Concealed (U1, Y1)	0005	(Slim) Concealed-Duct (F1, M1)
		0006	Concealed-Duct High Static Pressure (E1)	0007	Ceiling-Mounted (T1)	0008	Wall-mounted (K1)
		0010	Floor Standing (P1)	0011	Concealed Floor Standing (R1)		
11	Indoor unit capacity	0001	22 (Type 7)	0003	28 (Type 9)	0005	36 (Type 12)
		0007	45 (Type 15)	0009	56 (Type 18, 19)	0011	71 (Type 24) (For S-24MP1U6, S-24MR1U6)
		0012	80 (Type 24) (Except S-24MP1U6, S-24MR1U6)	0015	112 (Type 36)	0017	140 (Type 48)
		0018	160 (Type 54)				
12	System address	0001	Unit No. 1				
		0002	Unit No. 2				
		0003	Unit No. 3				
		〜	〜				
		0030	Unit No. 30				
		0099	Not set				
13	Indoor unit address	0001	Unit No. 1				
		0002	Unit No. 2				
		0003	Unit No. 3				
		〜	〜				
		0064	Unit No. 64				
		0099	Not set				
14	Group control address	0000	Individual (1:1 = Indoor unit with no group wiring)				
		0001	Main unit (One of the group-control indoor units)				
		0002	Sub unit (All group-control indoor units except for main unit)				
		0099	Not set				
17	Cooling intake temperature shift	−010	Shifts intake temperature by –20°F (– 10°C).				
		−009	Shifts intake temperature by –18°F (– 9°C).				
		〜	〜				
		−001	Shifts intake temperature by –2°F (– 1°C).				
		0000	No intake temperature shift				
		0001	Shifts intake temperature by +2°F (+ 1°C).				
		〜	〜				
		0009	Shifts intake temperature by +18°F (+ 9°C).				
		0010	Shifts intake temperature by +20°F (+ 10°C).				
18	Automatic stop time after operation start *Can be set in 5-minute units.	0000	Function disabled				
		0001	Stops automatically 5 minutes after operation starts.				
		0002	Stops automatically 10 minutes after operation starts.				
		〜	〜				
		0123	Stops automatically 615 minutes after operation starts.				
		0124	Stops automatically 620 minutes after operation starts.				
		0125	Stops automatically 625 minutes after operation starts.				

Item code	Item		Setting data	
			No.	Description
1b (1B)	Forced thermostat ON time		0000	5 minutes
			0001	4 minutes
1C	Cooling discharge temperature shift		–010	–20°F
			–009	–18°F
			–008	–16°F
			)	)
			0010	+20°F
1d	Heating discharge temperature shift		–010	–20°F
			–009	–18°F
			–008	–16°F
			)	)
			0010	+20°F
1E	Temperature shift for cooling/heating change in auto heat/cool mode		0001	±2°F
			0002	±4°F
			0003	±6°F
			)	)
			0007	±14°F
1F (Upper limit) 20 (Lower limit)	Change to remote control temperature setting range	Cooling	0018	64°F (Lower limit at shipment)
			0019	66°F
			)	)
			0029	84°F
			0030	86°F (Upper limit at shipment)
21 (Upper limit) 22 (Lower limit)		Heating	0016	60°F (Lower limit at shipment)
			0017	62°F
			)	)
			0029	84°F
			0030	86°F (Upper limit at shipment)
23 (Upper limit) 24 (Lower limit)		Drying	0018	64°F (Lower limit at shipment)
			0019	66°F
			)	)
			0029	84°F
			0030	86°F (Upper limit at shipment)
25 (Upper limit) 26 (Lower limit)		Auto heat/cool	0017	62°F (Lower limit at shipment)
			0018	64°F
			)	)
			0026	78°F
			0027	80°F (Upper limit at shipment)
29	Humidifier operation		0000	Normal
			0001	Ignore heat exchanger temperature conditions.
2A	Filter (CN70) input switching		0000	Filter input (differential pressure switch input)
			0001	Alarm input (for trouble input about air cleaner or similar device)
			0002	Humidifier input (Operates linked with drain pump when humidifier is ON.)
2C	Indoor unit electronic control valve		0000	Present (Setting at shipment)
			0002	None
2E	T10 terminal switching		0000	Normal (Used as optional relay PCB or JEMA standard HA terminal.)
			0001	Used for OFF reminder
			0002	Fire prevention input

Item code	Item	Setting data	
		No.	Description
2F	Automatic drain pump operation	0000	No forced operation
		0001	Forced operation for 1 minute
		)	)
		0060	Continuous operation
31	Ventilation fan operation	0000	None
		0001	Ventilation fan operated by remote controller.
32	Wired remote controller sensor	0000	Not used. (Body sensor is used.)
		0001	Remote control sensor is used.
34	"Operation change control in progress" display	0000	Normal (displayed)
		0001	Not displayed
35	OFF reminder function for when weekly timer is used	0000	None
		0001	Only stop time setting is enabled.
3A	Discharge temperature control	0000	Discharge temperature control OFF
		0001	Discharge temperature control ON
3C	Heat exchanger temperature for cold air discharge (Heat exchanger control point for control to prevent cold air)	0013	Control temperature 55°F
		0014	Control temperature 57°F
		)	)
		0025	Control temperature 77°F
		0026	Control temperature 78°F
3d	Fan output switching	0000	Output linked with fan. (ON when indoor unit fan is operating.)
		0001	Fan mode operation output
3E	Drain pump delayed start time	0000	No delayed start
		0001	1 sec. delayed start
		0002	2 sec. delayed start
		)	)
		0058	58 sec. delayed start
		0059	59 sec. delayed start
		0060	60 sec. delayed start
40	Humidifier setting	0000	Humidifier output OFF. Drain pump stopped.
		0001	Humidifier output ON. Drain pump operates.
		0002	Humidifier output ON. Drain pump operates for 1 minute when total humidifier operating time reaches 60 minutes.
		0003	Humidifier output ON. Drain pump stopped.
45	Flap operation mode	0000	Standard setting
		0001	Draft reduction mode (Flap lower-limit position is shifted upwards.)
46	Flap swing mode	0000	Smudging reduction mode (Flap swing upper-limit position is shifted downwards.)
		0001	Normal mode
		0002	Draft reduction mode (Flap swing lower-limit position is upwards.)

Item code	Item	Setting data		
		No.	Description	
Sd	Fan tap setting (Fan tap change in order to prevent drop in air discharge caused by filter installation)		DC fan tap operating mode	Purpose
		0000	Standard	Standard (setting at shipment)
		0001	High ceiling use	High ceiling setting 1 (with standard panel)
			For low static-pressure filter	Ultra long-life filter, oil guard panel, ammonia deodorizing filter, optical regenerative deodorizing filter
		0003	High ceiling use	High ceiling setting 2 (with standard panel)
			For low static-pressure filter	(Antibacterial) high-performance filter (90%) (Antibacterial) high-performance filter (65%) Air-cleaning unit, air-cleaning unit + optical regenerative deodorizing filter, deodorant (activated charcoal) filter
			For air-blocking material	For 3-way discharge, when discharge duct is connected
		0006	For air-blocking material	For 2-way discharge
SE	Humidifier ON time (ON time per 60 seconds)	0000	No humidifier output	
		0001	1 sec.	
		0002	2 sec.	
		≀	≀	
		0058	58 sec.	
		0059	59 sec.	
		0060	Continuously ON	
SF	Repeat timer switching	0000	Function disabled	
		0001	Function enabled	
60	Timer function change prohibit	0000	Function disabled	
		0001	Function enabled	
62	Smudging control	0000	No smudging control	

Simple setting items

Item code	Item	Description
01	Filter sign ON time setting (filter lifetime)	Changes the indoor unit filter lifetime when a high-performance filter or other optional product is installed.
02	Degree of filter fouling	Reduces the filter sign ON time to 1/2 of the standard time (setting at the time of shipping) for cases when filter fouling is more severe than normal.

Filter sign ON times for each model

Model data	Model	Filter sign ON time										
		Standard		Long-life		Super long-life		High performance 65		High performance 90		Pressure differential switch
		Standard	High fouling	Standard	High fouling	Standard	High fouling	Standard	High fouling	Standard	High fouling	
0000	1-Way Cassette (D1)	×	**75**	**2500**	**1250**	×	×	×	×	×	×	×
0001	4-Way Cassette (U1, Y1)	×	×	**2500**	**1250**	**5000**	**2500**	**2500**	**1250**	×	×	×
0005	Low Silhouette Ducted (F1) Slim Low Static Ducted (M1)	×	×	×	**1250**	**5000**	**2500**	**2500**	**1250**	**5000**	**2500**	×
0006	High Static Pressure Ducted (E1)	×	×	×	**1250**	×	×	**2500**	**1250**	**5000**	**2500**	×
0007	Ceiling (T1)	×	×	**2500**	**1250**	×	×	**2500**	**1250**	×	×	×
0008	Wall Mounted (K1)	**150**	**75**	×	×	×	×	×	×	×	×	×
0010	Floor Standing (P1)	**150**	**75**	×	×	×	×	×	×	×	×	×
0011	Concealed Floor Standing (R1)	**150**	**75**	×	×	×	×	×	×	×	×	×

Unit: hour

NOTE

- × indicates that there is no corresponding filter.
- 150 indicates the filter sign ON time that is set at shipment.
- High fouling: Set when 0001 is selected for the degree of filter fouling (item code 02).

4

Item code	Item	Description
03	Central control address	Set when using a central control device. Used when setting the central control address manually from the remote controller.
04	Operating mode priority change	Note (1)

NOTE

(1) Explanation of operation mode priority change

Enabled only in MINI VRF heat-pump models.

<Function>

With indoor units that are installed in combination with an outdoor unit model where either heating or cooling operation can be selected, the operating mode of the indoor unit that starts first takes priority. The first indoor unit to operate can select any operating mode. When any mode other than fan mode is selected, then the operating modes that cannot be selected are not displayed on all remote controllers that are subsequently operated. “Operation change control in progress” is displayed, indicating that there are restrictions on the operating modes that can be selected.

• Controlling the operating mode from a specific remote controller

- When there are multiple remote controllers in the same refrigerant system, it is possible to set one remote controller as the priority remote controller (the remote controller which is given priority for selecting the operating mode). (If 2 or more remote controllers are set as priority remote controllers, an alarm will occur at the remote controllers, and operation will not be possible.)
- When the priority remote controller is set to the operating mode for control, then all other remote controllers can select only the permitted operating mode, regardless of whether the priority remote controller is operating or stopped.
- When a controlled remote controller is operated, “Operation change control in progress” is displayed.

Set mode at priority remote controller	Modes that can be selected at other remote controllers
Cooling or dry	Cooling, dry, fan
Heating	Heating, fan
Fan	Whichever mode (heating/cooling) is selected first

NOTE

There are other methods to avoid control in which the mode selected first takes priority.

Methods of remotely controlling the operating mode

(1) Use the central functions of a central control device.

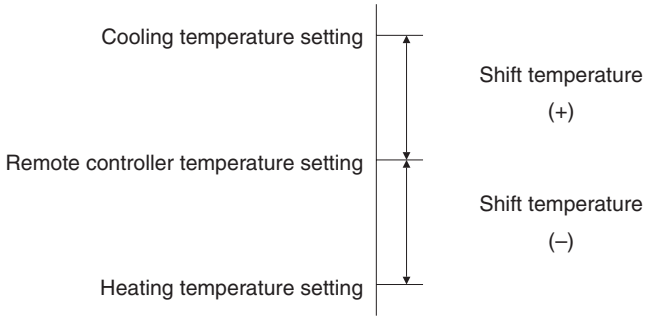
(2) Use a remote control relay PCB at the outdoor unit.

When the operating mode at the priority remote controller is changed, the operating modes of other remote controllers change as shown below.

Mode change at priority remote controller		Operating modes at other remote controllers	
Current mode	**New mode**	**Current mode**	**New mode**
Cooling or dry	Heating	Cooling or dry	Heating
		Fan	Fan (not changed)
Heating	Cooling	Heating	Cooling
		Fan	Fan (not changed)
Cooling	Dry	Cooling	Cooling (not changed)
		Dry	Dry (not changed)
Heating	Dry	Heating	Cooling
		Fan	Fan (not changed)
Cooling or dry	Fan	Cooling	Cooling (not changed)
		Dry	Dry (not changed)
		Fan	Fan (not changed)
Heating	Fan	Heating	Heating (not changed)
		Fan	Fan (not changed)

Item code	Item	Description
05	Fan speed setting when heating thermostat is OFF	Changes the fan speed setting when the heating thermostat is OFF.
06	Heating intake temperature shift	Shifts the intake temperature during heating. Can be set when the body thermostat is used.
07	Electric heater installation	Set when cost distribution is performed using an AMY central control system or similar system, and when an optional electric heater is installed. (This is unrelated to control of the electric heater.)
08	Humidifying when heater thermostat is OFF	Normally humidifying does not occur when the thermostat is OFF during heating operation. However, this setting can be changed in order to increase the amount of humidifying. Caution: In order to avoid water leakage and damage to the fan, do not use this setting unless a vaporizing humidifier is used.
0D	Permit/prohibit automatic heating/cooling	This setting can be used to prevent the automatic heating/cooling display on the remote control if the unit configuration permits automatic heating/cooling operation.
0F	Cooling-only	This setting allows a heat pump indoor unit to be operated as a cooling-only unit.

Item code	Item	Description
10	Unit type	Set when the indoor unit EEPROM memory is replaced during servicing.
11	Indoor unit capacity	
12	System (outdoor unit) address	These are not set at the time of shipping from the factory. These must be set after installation if automatic address setting is not performed.
13	Indoor unit address	
14	Group address	
17	Cooling intake temperature shift	Shifts the intake temperature during cooling and dry operation. (Enabled only when the body thermostat is used.) Increase this value when it is difficult to turn the thermostat ON.
18	Automatic stop time after operation start	The time at which an indoor unit is automatically stopped after operation starts can be set in increments of 5 minutes.
1E	Temperature shift for cooling/heating change in “auto heat/cool” mode	“Auto heat/cool” selects the operating mode automatically based on the difference between the room temperature and the temperature set on the remote controller. This setting establishes a shift temperature for the heating/cooling temperature setting relative to the remote controller temperature setting.



Item code	Item		Description
1F (Upper limit) **20** (Lower limit)	Change to the remote control temperature setting range	Cooling	This setting changes the temperature range (upper limit and lower limit) which is set from the remote controller or central control device. The set upper limit must be greater than or equal to the lower limit. If the temperature setting is to be a single point, set the upper limit and lower limit to the same temperature.
21 (Upper limit) **22** (Lower limit)		Heating	
23 (Upper limit) **24** (Lower limit)		Drying	
25 (Upper limit) **26** (Lower limit)		Auto heat/cool	
29	Humidifier operation which ignores the heat exchanger temperature		During heating operation, the humidifier operates when the heat exchanger temperature is suitable for humidifying. This setting is used to ignore this condition for humidifier operation and operate the humidifier more.
2A	Filter input switching		This setting switches the filter input according to the purpose of use.
2C	Indoor unit electronic control valve		This setting indicates whether or not an indoor unit electronic control valve is present. At the time of shipping, this setting is set according to the conditions of the indoor unit.
2E	T10 terminal input switching		Ordinarily, the T10 terminal is used as the HA terminal at the time of shipping. However, this setting is used when the T10 terminal is used for OFF reminder or for fire prevention input.
31	Ventilation fan operation from remote controller		It is possible to install a total heat exchanger and ventilation fan in the system, which can be started and stopped by the wired remote controller. The ventilation fan can operate linked with the start and stop of the indoor unit, or can be operated even when the indoor unit is stopped. Use a ventilation fan that can accept the no-voltage A contact as the external input signal. In the case of group control, the fans are operated together. They cannot be operated individually.
32	Switching to remote controller sensor		This setting is used to switch from the body sensor to the remote controller sensor. Check that “remote controller sensor” is displayed. Do not use this setting with models that do not include a remote controller sensor. Do not use this setting if both the body sensor and remote sensor are used.
34	ON/OFF of “Operation change control in progress” display		In a MULTI system with multiple remote controllers, switching between heating and cooling is restricted, and “Operation change control in progress” is displayed. This setting is used to prevent this display from appearing. Refer to the item concerned with operating mode priorities.
35	OFF reminder function for weekly timer		This setting switches the operation when the weekly timer is connected to the remote controller. This can be used to prevent cases in which the unit is accidentally left ON. There is no change when this setting is ON, however it is necessary to set the weekly timer ON time.

(Continued)

(Continued from previous page)

Item code	Item	Description
3C	Heat exchanger temperature for cold air discharge	The heat exchanger temperature control point for prevention of cold air discharge during heating operation can be changed.
3d	Fan output switching	The indoor unit PCB optional output for the fan can be switched according to the purpose of use.
3E	Drain pump delayed start time	The drain pump starts after the set time delay after cooling operation stops.
40	Humidifier drain pump setting	This specifies the humidifier and drain pump setting.
45	DC flap operation mode	Changes flap operation to draft reduction mode.
46	DC flap swing mode	Selects the swing operation mode for the flap.
5d	DC fan tap setting	Sets the DC fan tap according to the purpose of use. Change the settings data at the same time.
5E	Humidifier ON time	Sets the humidifier output ON time for when the humidifier is operating. ON/OFF control is performed during humidifier operation. This setting therefore sets the ON time per 60-second interval.
5F	Stop at time set for OFF timer after operation starts	This setting enables a function that stops operation when the amount of time set for the OFF timer has passed after remote controller operation was started.
60	Timer function change prohibit	This function prohibits changes from being made to the remote controller time setting.
62	Smudging control	Smudging control is disabled when 0000 is set.

- The remote controller includes a number of servicing functions. Use these as needed for test runs and inspections.

List of Servicing Functions

<table>
<tr><th>Functions</th><th>Description</th><th>Button operation</th><th>Reset operation</th><th>Unit status</th></tr>
<tr><td>Test run</td><td>Operation with forced thermostat ON</td><td>Press and hold the button for 4 seconds or longer.</td><td rowspan="5">Press the button.</td><td rowspan="3">Current operation is maintained.</td></tr>
<tr><td>Sensor temperature display</td><td>Temperature display from each sensor</td><td>Press and hold the and CANCEL buttons for 4 seconds or longer.</td></tr>
<tr><td>Servicing check display</td><td>Alarm history display</td><td>Press and hold the and SET buttons for 4 seconds or longer.</td></tr>
<tr><td>Simple settings</td><td>Filter life time, operating mode priority, central control address, and other settings</td><td>Press and hold the and buttons for 4 seconds or longer.</td><td rowspan="2">When settings are made from a remote controller, the indoor unit where that remote controller is connected stops.</td></tr>
<tr><td>Detailed settings</td><td>System address, indoor unit address, central control address, and other settings</td><td>Press and hold the , CANCEL and SET buttons for 4 seconds or longer.</td></tr>
<tr><td>Automatic address</td><td>Automatic address setting based on command from the wired remote controller</td><td>Press and hold the and the timer operation buttons for 4 seconds or longer.</td><td>Automatic reset</td><td rowspan="2">Entire system stops.</td></tr>
<tr><td>Address change</td><td>Change of indoor unit address</td><td>Press and hold the and the timer operation buttons for 4 seconds or longer.</td><td>Press the button.</td></tr>
</table>

Test Run Function

Operates the unit with the thermostat forced ON.

<Procedure>

① Press and hold the button for 4 seconds or longer.

② "Test" appears on the remote controller LCD display (Fig. 4-3).

③ Start operation.

④ Press the button to return to normal remote controller display.

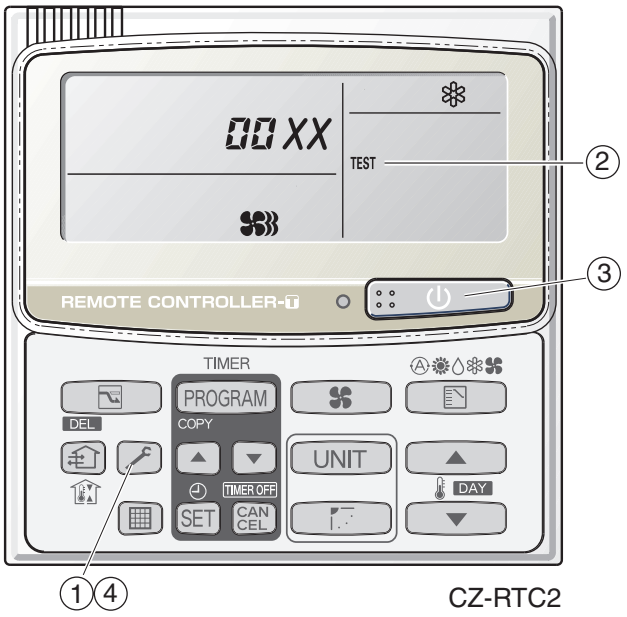


Fig. 4-3

■ Sensor Temperature Display Function (displayed regardless of whether unit is operating or stopped)

The procedure below displays the sensor temperatures from the remote controller, indoor unit, and outdoor unit on the remote controller.

<Procedure>

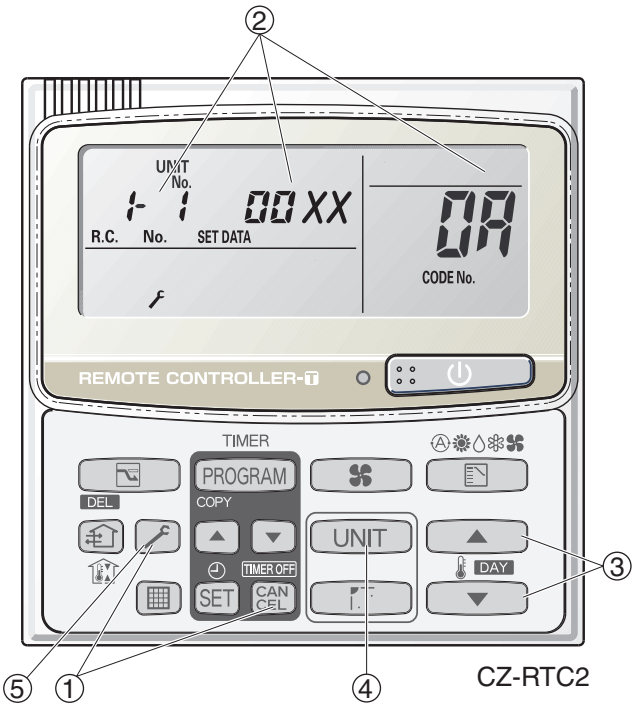
① Press and hold the [🔧] and [CANCEL] buttons simultaneously for 4 seconds or longer.

② The unit No. "X-X" (main unit No.), item code "XX" (sensor address), and servicing monitor " 00XX " (sensor temperature) are displayed on the remote controller LCD display. (See Fig. 4-4 at right.)

③ Press the temperature setting [▲] / [▼] buttons and select the item code to the address of the sensor to monitor.
(For the relationships between the sensor addresses and sensor types, refer to the table of temperature sensors and addresses on the next page.)

④ If group control is in effect, press the [UNIT] button to select the unit to monitor.
Press the temperature setting buttons to select the item code to change.

⑤ Press the [🔧] button to return to normal remote controller display.



CZ-RTC2

* The temperature on the remote controller is displayed in Celsius (C).
Please note that you will not mistakenly read it in Fahrenheit (F) on the display.

Fig. 4-4

NOTE

The temperature display appears as "- - - -" for units that are not connected.

* If monitor mode is engaged while normal operation is in progress, only the parts of the LCD display shown in the figure will change. Other parts continue to display the same information as during normal operation.

Indoor unit sensors	
02	Intake temp.
03	E1
04	E2
05	E3
06	Discharge temp.
07	Discharge temp. setting
08	Position of indoor unit electronic control valve

Outdoor unit sensors	
Unit No.1	
0A	Discharge temp. 1
0B	—
0C	High-pressure sensor temp.
0D	Heat exchanger gas 1
0E	Heat exchanger liquid 1
0F	—
10	—
11	Outdoor air temp.
12	—
13	Inverter primary current
14	—
15	MOV1 pulse
16	—
17	—
18	—
19	Actual operating frequency
1A	—
1B	—
1C	—
1D	—
1E	—
1F	—
20	—
21	—
22	—

5. TROUBLE DIAGNOSIS

1. Contents of Remote Controller Switch Alarm Display **5**-2
2. Outdoor Unit Control Panel LED Display **5**-4
3. Remote Controller Servicing Functions **5**-5
4. Mini VRF Alarm Codes **5**-6
5. Inspection of Parts (Outdoor Unit) **5**-18

1. Contents of Remote Controller Switch Alarm Display

ON: ○ Blinking: ☼ OFF: ●

Possible cause of malfunction			Wired remote control display	Wireless remote controller receiver display		
				Operation	Timer	Standby for heating
Serial communication errors Mis-setting	Remote controller is detecting error signal from indoor unit.	Error in receiving serial communication signal. (Signal from main indoor unit in case of group control) Ex: Auto address is not completed.	<E01>	☼	●	●
		Error in transmitting serial communication signal.	<E02>			
	Indoor unit is detecting error signal from remote controller (and system controller).		<<E03>>			
	Indoor unit is detecting error signal from outdoor unit.	Error in receiving serial communication signal. When turning on the power supply, the number of connected indoor units does not correspond to the number set. (Except R.C. address is "0.")	E04	●	●	☼
		Error of the outdoor unit in receiving serial communication signal from the indoor unit.	<E06>			
	Improper setting of indoor unit or remote controller.	Indoor unit address setting is duplicated.	E08	☼	●	●
		Remote controller address connector (RCU. ADR) is duplicated. (Duplication of main remote controller)	<<E09>>			
	During auto address setting, number of connected units does not correspond to number set.	Starting auto address setting is prohibited. This alarm message shows that the auto address connector CN100 is shorted while other RC line is executing auto address operation.	E12			
	When turning on the power supply, number of connected units does not correspond to number set. (Except R.C. address is "0.")	Error in auto address setting. (Number of connected indoor units is less than the number set)	E15	●	●	☼
		Error in auto address setting. (Number of connected indoor units is more than the number set)	E16			
		No indoor unit is connected during auto address setting.	E20			
		Error of outdoor unit address setting.	E25			
	Indoor unit communication error of group control wiring.	Error of main indoor unit in receiving serial communication signal from sub indoor units.	E18	☼	●	●
	Improper setting.	This alarm message shows when the indoor unit for multiple-use is not connected to the outdoor unit.	L02	☼	●	☼
		Duplication of main indoor unit address setting in group control.	<L03>			
		There are 2 or more indoor units controllers which have operation mode priority in 1 refrigerant circuit. — Priority set remote controller	L05			
		There are 2 or more indoor units controllers which have operation mode priority in 1 refrigerant circuit. — Non-priority set remote controller	L06			
		Group control wiring is connected to individual control indoor unit.	L07			
		Indoor unit address is not set.	L08			
		Capacity code of indoor unit is not set.	<<L09>>			
		4-way valve operation failure	L18			
		Duplication of outdoor R.C. address setting.	L04	☼	○	☼
		Capacity code of outdoor unit is not set.	L10			
Activation of protective device	Protective device in indoor unit is activated.	Thermal protector in indoor unit fan motor is activated.	<<P01>>	●	☼	☼
		Improper wiring connections of ceiling panel.	<<P09>>			
		Float switch is activated.	<<P10>>			

Continued

1. Contents of Remote Controller Switch Alarm Display

ON: ○ Blinking: ☼ OFF: ●

Possible cause of malfunction			Wired remote control display	Wireless remote controller receiver display		
				Operation	Timer	Standby for heating
Activation of protective device	Protective device in outdoor unit is activated.	Incorrect discharge temperature. (Comp.)	P03	☼	●	☼
		Operation of O_2 sensor	P14			
		Outdoor unit fan motor is unusual.	P22			
		Compressor running failure resulting from missing phase in the compressor wiring, etc. (Start failure not caused by IPM or no gas.)	P16			
		Overcurrent at time of compressor runs more than 80Hz (DCCT secondary current or ACCT primary current is detected at a time other than when IPM has tripped.)	P26			
		Inverter for compressor is unusual. (DC compressor does not operate.)	P29			
		IPM trip (IPM current or temperature)	H31	●	☼	●
Thermistor fault	Indoor thermistor is either open or damaged.	Indoor coil temp. sensor (E1)	<<F01>>	☼	☼	●
		Indoor coil temp. sensor (E2)	<<F02>>			
		Indoor coil temp. sensor (E3)	<<F03>>			
		Indoor suction air (room) temp. sensor (TA)	<<F10>>			
		Indoor discharge air temp. sensor (BL)	<<F11>>			
	Outdoor thermistor is either open or damaged.	Comp. discharge gas temp. sensor (TD)	F04	☼	☼	○
		Outdoor coil liquid temp. sensor (C1)	F07			
		Outdoor air temp. sensor (TO)	F08			
		Compressor intake port temperature sensor (TS)	F12			
		High pressure sensor	F16			
EEPROM on indoor unit PCB failure			F29	☼	☼	●
Protective device for compressor is activated	Protective device for compressor is activated.	EEPROM on the outdoor unit PCB has failed.	F31	☼	☼	○
		Current is not detected when comp. is ON.	H03	●	☼	●
		Overload current is detected.	H01			

5

2. Outdoor Unit Control Panel LED Display

(○ : ON ☼ : Blinking ● : OFF)

LED		Display meaning
D042(1)	D043(2)	
○	○	After the power is turned ON (and automatic address setting is not in progress), no communication with the indoor units in that system is possible.
(Both ON)		
●	○	After power is turned ON (and automatic address setting is not in progress), 1 or more indoor units are confirmed in that system; however, the number of indoor units does not match the number that was set.
(OFF)	(ON)	
●	●	Automatic address setting was completed successfully. (After the power is turned ON, the number of detected indoor units connected to that system matches the number that was set, and regular communications are occurring.)
(Both OFF)		
☼	☼	Automatic address setting is in progress.
(Blinking alternately)		
☼	☼	At time of automatic address setting, the number of indoor units did not match the number that was set.
(Both blinking)		
☼	☼	Alarm display LED 1 blinks M times, then LED 2 blinks N times. The cycle then repeats. M = 2: P alarm 3: H alarm 4: E alarm 5: F alarm 6: L alarm N = Alarm No. Example: LED 1 blinks 2 times, then LED 2 blinks 17 times. The cycle then repeats. Alarm is “P17.”
(Blinking alternately)		

5

Sensor temperature display function (displayed regardless of whether unit is operating or stopped)

- Use the following check procedure to display the sensor temperatures from the remote controller, indoor unit, and outdoor unit sensors on the remote controller display.

<Check procedure>

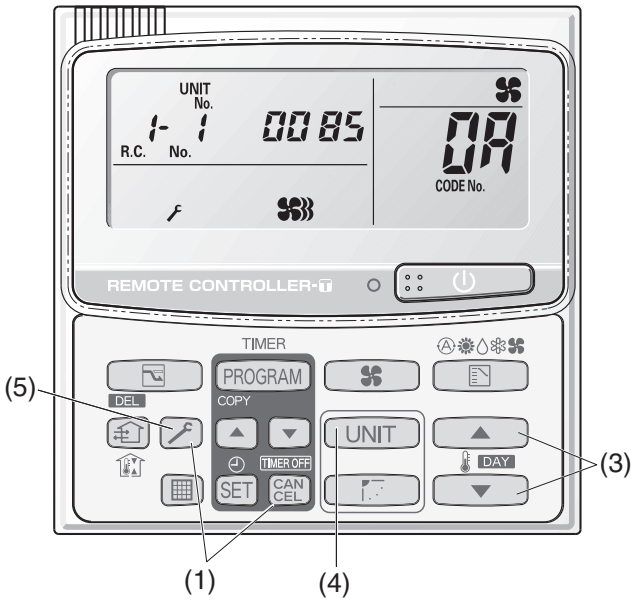
(1) Press and hold the CANCEL (CANCEL) button and (CHECK) button simultaneously for 4 seconds or longer.

(2) The following appears on the remote controller LCD display: UNIT No. X – X (main unit No.), CODE No. XX (sensor address), and service monitor 00XX (sensor temperature).
(See figure at right.)

(3) Press the temperature setting ▲ and ▼ buttons to change the item code to the sensor address of the sensor you wish to monitor.
(For the relationship between the sensor address and sensor type, refer to the sensor temperature relationship table below.)

(4) If group control is in effect, press the UNIT (UNIT) button to change to the unit you wish to monitor.

(5) Press the (CHECK) button to return to normal remote controller operation.



Display shows a discharge temperature of 85°C at unit No. 1-1

NOTE

The temperature display for units that are not connected appears as "- - - -."

- If monitor mode is engaged during normal operation, only the part of the LCD display indicated in the figure changes. The other parts remain unchanged during normal operation.

NOTE

- The temperature on the remote controller is displayed in Celsius (C).
- Please note that you will not mistakenly read it in Fahrenheit (F) on the display.
- Returns to normal display.

Sensor Temperature Relationship Table

Location where sensor is installed	Sensor address	Sensor type	Sensor address	Sensor type
Indoor unit	00	Room temperature *1	05	Indoor unit heat exchanger temperature (E3)
	01	Remote controller temperature	06	Discharge temperature sensor
	02	Indoor unit intake temperature	07	—
	03	Indoor unit heat exchanger temperature (E1)	08	Indoor unit electronic expansion valve position
	04	—	09	—
Outdoor unit	0A	Discharge temperature 1	12	—
	0C	High-pressure sensor temperature	13	CT (Inverter primary current)
	0d	Suction temperature (TS)	15	MOV1 pulse
	0E	Outdoor unit heat exchanger temperature (C1)	16	—
	11	Outside air temperature	19	Actual operating Frequency

*1 Main unit only in case of group control.

Alarms for outdoor units

Alarm Code	Alarm Meaning	Page
E06	Outdoor unit failed to receive serial communication signals from indoor unit.	7
E12	Automatic address setting start is prohibited.	7
E15	Automatic address setting alarm (too few units)	7
E16	Automatic address setting alarm (too many units)	8
E20	No indoor units at automatic address setting.	8
E25	Outdoor unit address setting failure (duplication)	8
F04	Compressor discharge temperature sensor (TD) trouble	9
F07	Liquid temperature sensor trouble at outdoor heat exchanger (C1)	10
F08	Outdoor air temperature sensor (TO) trouble	10
F12	Compressor suction temperature sensor (TS) trouble	10
F16	High-pressure sensor trouble	11
F31	Outdoor unit non-volatile memory (EEPROM) trouble	12
H03	Compressor CT sensor disconnected or short-circuit	12
H31	HIC trouble alarm	13
L04	Outdoor unit address duplication	13
L05	Indoor unit priority duplication (at priority indoor units)	14
L06	Indoor unit priority duplication (at non-priority indoor units) and outdoor unit	14
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L18	4-way valve operation failure	15
P03	Compressor discharge temperature trouble	15
P16	Inverter compressor overcurrent alarm	16
P22	Fan motor trouble	16
P26	Inverter compressor high-frequency overcurrent alarm	16
P29	Inverter compressor missing phase or lock alarm	17

E06 alarm

Alarm code	**E06**
Alarm meaning	Outdoor unit failed to receive serial communication signals from indoor unit.
Alarm conditions	No serial communications from indoor unit
Probable cause	(1) The indoor unit power was cut OFF after initial communications were completed. (2) An open circuit or short circuit occurred in the inter-unit control wiring after initial communications were completed.
Check	Check the power at the indoor and outdoor units, and check the inter-unit control wiring.
Correction	—
Example	—
Notes	This alarm is detected after initial communications are completed. Therefore, it does not occur in cases of “disconnected serial connector, ” “no terminal unit set,” or other trouble that occurs before initial communications are completed. If initial communications have not been completed, alarm E04 occurs.

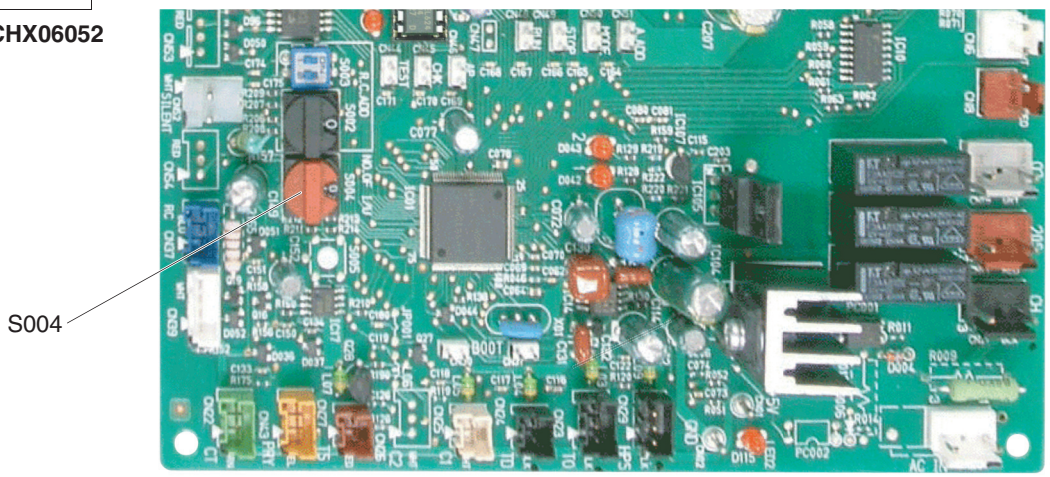
E12 alarm

Alarm code	**E12**
Alarm meaning	Automatic address setting start is prohibited.
Alarm conditions	Automatic address setting was started when automatic address setting was in progress at another outdoor unit in the same link.
Probable cause	Automatic address setting is in progress at another outdoor unit.
Check	This alarm is not displayed on the remote controller. Therefore check the blinking LED display on the outdoor unit PCB.
Correction	Wait for automatic address setting to be completed at the outdoor unit where it is currently in progress. Then start automatic address setting again.
Example	—
Notes	—

E15 alarm

Alarm code	**E15**
Alarm meaning	Automatic address setting alarm (too few units)
Alarm conditions	The number of indoor units was too few when automatic address setting was performed.
Probable cause	(1) The number of indoor units set at the indoor unit quantity setting SW (S004) on the outdoor unit PCB is too many. (2) The inter-unit control wiring between indoor units has been cut.
Check	(1) Refer to the test run servicing materials and check the indoor unit quantity setting SW (S004). (2) Check the inter-unit control wiring at the indoor and outdoor units.
Correction	After correcting the indoor unit quantity setting or the inter-unit control wiring, perform automatic address setting again.
Example	—
Notes	

CR-CHX06052



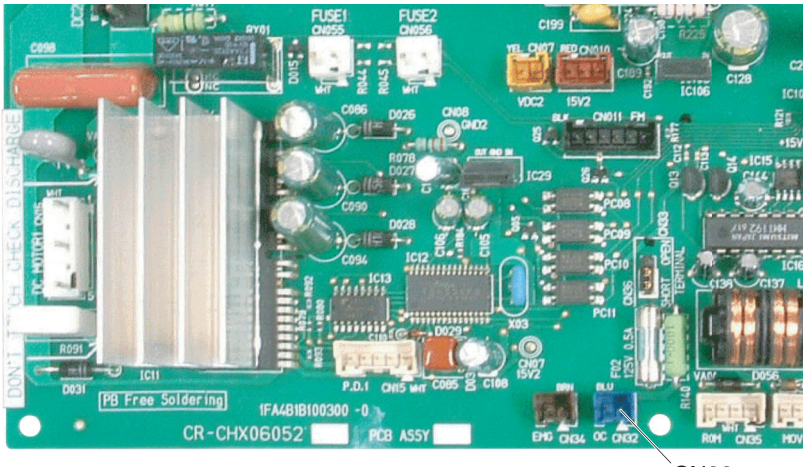
E16 alarm

Alarm code	**E16**
Alarm meaning	Automatic address setting alarm (too many units)
Alarm conditions	• The number of indoor units was too many when automatic address setting was performed. • After initial communications were completed, an unrecognized unit was detected.
Probable cause	(1) The number of indoor unit setting SW (S004) on the outdoor unit PCB is too small. (2) The inter-unit control wiring is wired incorrectly.
Check	(1) Refer to the test run servicing materials and check the number of indoor units that is set. (2) Check the inter-unit control wiring at the indoor and outdoor units.
Correction	After correcting the indoor unit quantity setting or the inter-unit control wiring, perform automatic address setting again.
Example	—
Notes	—

E20 alarm

Alarm code	**E20**
Alarm meaning	No indoor units at automatic address setting.
Alarm conditions	When automatic address setting was performed, no indoor units were recognized.
Probable cause	(1) The inter-unit control wiring from the outdoor unit to the indoor units has been cut. (2) Serial connector 1 (CN32) is disconnected at the outdoor unit. (3) The power is OFF at all indoor units in the system.
Check	(1) Check whether the inter-unit control wiring from the outdoor unit to the indoor units is cut. (2) Check whether serial connector 1 (CN32) is disconnected at the outdoor unit. (3) Check the power at the indoor units.
Correction	(1) Repair inter-unit control wiring from outdoor / indoor units. (2) Plug connector 1 (CN32) in correctly. (3) Turn on the power to indoor units.
Example	—
Notes	

Position of serial connector 1
CR-CHX06052



E25 alarm

Alarm code	**E25**
Alarm meaning	Outdoor unit address setting failure (duplication)
Alarm conditions	Communication by outdoor unit main-sub control wiring was received that contained the same address as that unit 5 times or more within 3 minutes.
Probable cause	The unit number is set incorrectly.
Check	Check the unit number again.
Correction	Correct the incorrect unit number setting.
Example	—
Notes	Recovery from this alarm occurs automatically (when communication that contains the same address is not received for 3 minutes).

F04 alarm

Alarm code	**F04**
Alarm meaning	Compressor 1 discharge temperature sensor trouble
Alarm conditions	(1) A temperature of 212°F or higher was detected 20 minutes or longer after that compressor stopped running. (2) Temperature is 176°F or higher when the outdoor unit has been stopped for 60 minutes or longer. Details are given in the servicing technical materials. (3) A/D step is 10 steps or less (short circuit).
Probable cause	(1) Sensor malfunction • Sensor element malfunction • Sensor wiring is partially disconnected, resulting in increased electrical resistance. ☆ This alarm does not occur when the wiring is completely cut or when the connector is not connected to the outdoor unit PCB. (2) Outdoor unit PCB failure (3) An air short blockage in the area around the outdoor unit has increased the outdoor unit ambient temperature, reducing the cooling effects after the compressor stops. (4) There is a cause that results in P03 alarm. (5) Electrical noise
Check	(1) Sensor malfunction and outdoor unit PCB failure Trouble: • Constantly indicates a high temperature. • When monitoring software or other means are used for monitoring, the discharge temperature at times fluctuates suddenly and wildly. • In some cases, the precise temperature may not be known, even when monitoring software is used. Check: • Wiggle the sensor and check whether the trouble continues. • Check whether the connector is partially disconnected from the PCB. ☆ An F04 alarm will not result if the connector is completely disconnected (circuit is open). (2) Leakage from the discharge tube check valve Trouble: Although the other compressor is operating and this compressor is stopped, the discharge temperature of this compressor rises together with the temperature of the other compressor. (3) If the cause is still unknown after checking the above, then it is possible that electrical noise is the cause of the trouble. It is necessary to provide a line filter or carry out other noise countermeasures.
Correction	(1) Replace the sensor. (2) Carry out noise countermeasures. (3) Adjust the amount of refrigerant. (4) Correct the trouble.
Example	(1) Sensor wiring is partially cut.
Notes	This alarm does not indicate that the sensor is disconnected. In order to prevent overheating during operation, the outdoor units in this system will not allow a compressor to start if the discharge temperature does not decrease while the compressor is stopped. If a sensor malfunction results in continuous detection of a high discharge temperature, then the compressor may stop for no apparent reason. The purpose of this alarm is to facilitate identification of the problem in this case.

F07 alarm

Alarm code	**F07**
Alarm meaning	Liquid temperature sensor (C1) trouble at outdoor heat exchanger
Alarm conditions	(1) A/D step is 10 steps or less (short circuit). (2) A/D step is 1014 steps or more (open circuit).
Probable cause	(1) Sensor malfunction (including connector) (2) PCB malfunction
Check	(1) Measure the sensor resistance. Check that the sensor is operating normally. (2) Use a remote controller monitor or PC monitor to check the temperature that is recognized by the microcomputer.
Correction	—
Example	—
Notes	—

F08 alarm

Alarm code	**F08**
Alarm meaning	Outdoor air temperature sensor trouble
Alarm conditions	(1) A/D step is 10 steps or less (short circuit). (2) A/D step is 1014 steps or more (open circuit)
Probable cause	(1) Sensor malfunction (including connector) (2) PCB malfunction
Check	(1) Measure the sensor resistance. Check that the sensor is operating normally. (2) Use a remote controller monitor or PC monitor to check the temperature that is recognized by the microcomputer.
Correction	—
Example	—
Notes	—

F12 alarm

Alarm code	**F12**
Alarm meaning	Compressor intake temperature sensor trouble
Alarm conditions	(1) A/D step is 10 steps or less (short circuit). (2) A/D step is 1014 steps or more (open circuit)
Probable cause	(1) Sensor malfunction (including connector) (2) PCB malfunction
Check	(1) Measure the sensor resistance. Check that the sensor is operating normally. (2) Use a remote controller monitor or PC monitor to check the temperature that is recognized by the microcomputer.
Correction	—
Example	—
Notes	—

F16 alarm

Alarm code	**F16**
Alarm meaning	High-pressure sensor trouble
Alarm conditions	The saturation temperature at the detected pressure is 10°F or more below the highest indoor-unit E1 temperature continuously for 30 minutes.
Probable cause	(1) High-pressure sensor malfunction (2) Failure to connect the connector to the outdoor unit PCB (3) Failure to open the service valve (4) Clogged tubing (5) Valve leakage (6) Over-charging (7) Outdoor unit PCB failure (8) Electrical noise
Check	(1) High-pressure sensor failure • Check for cut wiring. • Connect a gauge to the high-pressure outlet and check for changes in the value displayed by the monitoring software, and for large deviation of the gauge pressure. • During heating, check whether the temperature is lower than the highest indoor-unit E1 temperature. * The pressure detected by the high-pressure sensor is the highest pressure in the system. Therefore during heating the converted saturation temperature will never be lower than any indoor-unit E1 temperature. During cooling this temperature will never be lower than the outdoor unit liquid temperature. (2) Failure to open the service valve, clogged tubing, valve leakage, over-charging In all of these cases, an alarm occurs when there are rapid pressure fluctuations and tracking of the detected pressure is poor. • Check the open/closed status of the valve. • Check for valve leakage and over-charging When valve leakage or over-charging occurs, refrigerant is likely to accumulate in the outdoor units or indoor units, resulting in a sudden rise in pressure at start that occurs before the refrigerant in the heat exchanger is discharged. * The representative valve to check is a mechanical valve. (3) Outdoor unit PCB failure • The check items are the same as for a high-pressure sensor malfunction. A normal PCB is needed to determine whether the problem is a PCB failure or a pressure sensor malfunction. If an abnormality was found at the check items for a high-pressure sensor malfunction, first try replacing the PCB and check again. Trouble is corrected: Outdoor unit PCB failure Trouble is not corrected: High-pressure sensor malfunction
Correction	(1) Replace the high-pressure sensor. Caution: Because the high-pressure sensor connection incorporates a Schrader-type valve, it can be removed and replaced. However, the high-pressure sensor can be easily damaged by high voltage; therefore use sufficient caution with regard to static electricity. (2) Replace the PCB. (3) Correct the locations of problems in the refrigeration cycle. • Correct locations where clogging or leakage has occurred. • In the case of over-charging, recover refrigerant. (Adjust the amount of refrigerant).
Example	This alarm may result when the service valve is closed or when valve leakage (particularly from the mechanical valve) occurs.

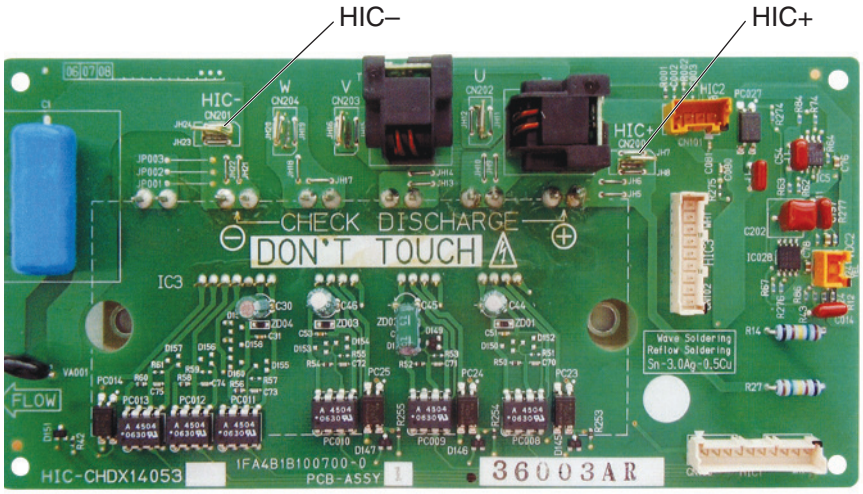
F31 alarm

Alarm code	**F31**
Alarm meaning	Outdoor unit non-volatile memory (EEPROM) trouble
Alarm conditions	(1) Non-volatile memory is not present when power initialization occurs. (2) Read values do not match after writing to non-volatile memory is complete.
Probable cause	(1) Memory was not inserted after the PCB was replaced. (2) The lifetime of the non-volatile memory has been reached. (3) Non-volatile memory is installed incorrectly (wrong direction, bent pins, etc.).
Check	(1) Check the non-volatile memory on the PCB.
Correction	—
Example	—
Notes	—

H03 alarm

Alarm code	**H03**
Alarm meaning	Compressor CT sensor disconnected or short-circuit
Alarm conditions	Alarm occurs if the current value is 1.5 A or less when 2 seconds or longer have elapsed after output from that compressor started. * No current is detected even though the compressor is operating.
Probable cause	(1) CT circuit failure (including cut wiring, etc.) (2) Disconnected CT circuit connector (3) This CT circuit is connected to the connector of the other CT circuit. (4) PCB failure (5) Noise
Check	(1) CT circuit failure, PCB failure Trouble: • Current value during compressor operation is below the threshold value. Check: • Check that the connector is not disconnected. • Check the continuity of the CT circuit. Install a normal CT in place of this CT and check. If current is detected, then the PCB can be judged OK. → CT circuit failure • Check that current is flowing in the phase where the CT circuit is connected. → Check voltage and current. (2) Crossed wiring or installation error Trouble: When the compressor is stopped, the current value at the other compressor is high. (3) If the cause is still unknown after checking the above, then it is possible that noise is the cause of the trouble. It is necessary to connect a PC or other instrument.
Correction	(1) Replace the CT circuit. (2) Replace the outdoor unit PCB. (3) Correct the problem.
Example	(1) The connector was not inserted after the PCB was replaced.
Notes	Use a normal CT as a tool to determine whether the trouble is a PCB failure or CT failure.

H31 alarm

Alarm code	**H31**
Alarm meaning	HIC trouble alarm
Alarm conditions	This alarm occurs when the microcomputer identifies a trouble signal (indicating abnormal HIC temperature or other trouble) from the HIC.
Probable cause	The HIC judges the current and temperature, and outputs the trouble signal. In general this indicates trouble with the HIC itself.
Check	Check the power wiring and connector wiring. If the wiring and connectors are normal, use a tester to measure the resistance between the compressor HIC power (HIC+) and ground (HIC–). If there is a short circuit, there is an HIC malfunction.  **HIC PCB**
Correction	If an HIC failure is found, replace the PCB.
Example	—
Notes	Turn OFF the power, and check the conductivity of HIC+ and HIC– on the HIC PCB.

L04 alarm

Alarm code	**L04**
Alarm meaning	Outdoor system address duplication
Alarm conditions	Communication by inter-unit control wiring was received that contained the same address as that unit 5 times or more within 3 minutes.
Probable cause	Incorrect outdoor system address settings
Check	Check the system address settings again.
Correction	Correct the system address settings.
Example	—
Notes	Recovery from this alarm occurs automatically (when communication that contains the same address as that unit is not received for 3 minutes after detection).

L05 alarm

Alarm code	**L05**
Alarm meaning	Indoor unit priority duplication (at priority indoor units)
Alarm conditions	More than 1 indoor unit set for priority was detected.
Probable cause	More than 1 indoor unit is set for priority.
Check	From the wired remote controller, use the indoor unit EEPROM simple setting mode and check that the value of item code 04 is “0001.”
Correction	Use the wired remote controller and correct the setting if the value of indoor EEPROM item code 04 is incorrect.
Example	—
Notes	This alarm is displayed at the indoor units that are set for priority. Alarm L06 is displayed at the indoor units that are not set for priority.

L06 alarm

Alarm code	**L06**
Alarm meaning	Indoor unit priority duplication (at non-priority indoor units) and outdoor unit
Alarm conditions	More than 1 indoor unit set for priority was detected in the system.
Probable cause	More than 1 indoor unit is set for priority in the system.
Check	Find the indoor units where alarm L05 has occurred in the system.
Correction	Refer to the alarm L05 correction.
Example	—
Notes	Alarm L06 occurs as a result of alarm L05. When the duplicated priority settings are corrected, alarm L06 is also corrected.

L10 alarm

Alarm code	**L10**
Alarm meaning	Outdoor unit capacity not set
Alarm conditions	The outdoor unit capacity has not been set, or the setting is not allowed by the system.
Probable cause	This alarm occurs because the capacity has not been set.
Check	Connect the outdoor unit maintenance remote controller. On the outdoor unit EEPROM detailed setting mode screen, check the value for the outdoor unit capacity (item code 81). Check that it is not set to “0” or to a capacity that is not allowed.
Correction	If item code 81 is incorrect, use the outdoor unit maintenance remote controller and set it correctly. * After changing the setting, be sure to reset both the indoor and outdoor power.
Example	—
Notes	The outdoor unit maintenance remote controller is required in order to set the capacity in the outdoor unit EEPROM.

L18 alarm

Alarm code	**L18**
Alarm meaning	4-way valve operation failure
Alarm conditions	During heating, when 2 minutes and 30 seconds have elapsed after compressor operation started, the temperature difference between the outdoor air temperature sensor and the heat exchanger liquid temperature sensor (C1) is 40°F or higher.
Probable cause	(1) The 4-way valve connector (20S CN005) has become disconnected from the control PCB. (2) The 4-way valve circuit is locked (malfunctioning).
Check	(1) Check the 4-way valve connector (20S CN005). (2) If the connector is normal, check the 4-way valve wiring and the PCB circuit.
Correction	If the connector is normal, correct or replace the problem locations.
Example	—
Notes	—

P03 alarm

Alarm code	**P03**
Alarm meaning	Compressor discharge temperature trouble
Alarm conditions	Inverter compressor: Temperature is 222°F or higher and pre-trip stop has occurred.
Probable cause	(1) Insufficient amount of refrigerant (including trouble resulting from an insufficient initial charge and from gas leakage) Blocking of low-pressure parts caused by intrusion of foreign objects (moisture, scale, etc.) (2) Expansion valve operation failure (3) Compressor discharge sensor failure (4) PCB failure (A/D conversion failure) (5) Electrical noise
Check	(1) Insufficient refrigerant Trouble: Liquid effectiveness is poor. Check: Check whether or not the superheating temperature is declining if the evaporator mechanical valve is opened to 300 pulses or more (after checking for foreign object intrusion). (2) Sensor failure Check: • This alarm is likely to occur when wiring is partially cut. (It can be difficult to identify, even when conductivity is checked.) The detected discharge temperature is high. • Although such conditions rarely occur, a P02 alarm is likely if the detected discharge temperature is low. • Replace the sensor with another discharge sensor and compare the temperature conditions. (3) If the cause is still unknown after checking the above, then it is possible that electrical noise is the cause of the trouble.
Correction	(1) Replace the sensor. (2) Replace the outdoor unit PCB. (3) Correct the problem locations.
Example	All of the probable causes
Notes	Operates continuously for a set length of time. Indicates 2 minutes 30 seconds or longer for an inverter unit.

P16 alarm

Alarm code	**P16**
Alarm meaning	Inverter compressor overcurrent alarm
Alarm conditions	This alarm occurs when current trouble or current detection trouble occurs at an inverter frequency of less than 80 Hz after start (when trouble judgment current is detected in the primary or secondary current, or when an instantaneous secondary current of 48 A or higher is detected).
Probable cause	There is a strong possibility of a compressor failure. An alarm occurs for current detection trouble when it is judged that no current is flowing after start (DCCT is damaged). In this case, the cause is a DCCT failure.
Check	Check the power wiring and connector wiring.
Correction	It is possible to resolve this trouble by limiting the maximum frequency.
Example	—
Notes	—

P22 alarm

Alarm code	**P22**
Alarm meaning	Fan motor trouble
Alarm conditions	Fan motor start failure, fan motor Hybrid IC input failure
Probable cause	Possible causes are a Hybrid IC input circuit failure or a fan HIC failure.
Check	Check the fan motor wiring, the Hybrid IC wiring, and the connector connections. If the wiring and connectors are normal, then check that the capacitor of the Hybrid IC input circuit is securely soldered onto the PCB. Also use a tester and measure the resistance between fan HIC power (HIC+) and ground (HIC–). If there is a short circuit, there is an HIC malfunction.
Correction	If the fan does not start, the below corrections may be effective. (1) If there is a fan HIC failure or circuit failure, replace the PCB. (2) If the fan motor is locked, replace the fan motor.
Example	—
Notes	Turn OFF the power, and check the conductivity of “+” and “–” on the main PCB.

P26 alarm

Alarm code	**P26**
Alarm meaning	Inverter compressor high-frequency overcurrent alarm
Alarm conditions	This alarm occurs when current trouble or current detection trouble occurs at an inverter frequency of 80 Hz or higher after start (when trouble judgment current is detected in the primary or secondary current, or when an instantaneous secondary current of 48 A or higher is detected).
Probable cause	The detection methods are the same as for P16. However the fact that operation up to high frequencies is possible does not necessarily mean that a compressor failure is the cause of the trouble. Start the compressor several times. If alarm P26 occurs every time and alarm P16 does not occur at all, then the possibility of a compressor failure is low.
Check	Check the power wiring and connector wiring.
Correction	It is possible to resolve this trouble by limiting the maximum frequency.
Example	—
Notes	—

P29 alarm

Alarm code	**P29**
Alarm meaning	Inverter compressor missing phase or lock alarm
Alarm conditions	This alarm may occur at start, and occurs when missing phase or lock is detected, and when a DCCT failure occurs.
Probable cause	Generally this alarm occurs when the refrigerant pressure balance is uneven at start, when inverter compressor lock occurs, there is a missing phase in the inverter compressor wiring, or a DCCT failure occurs. This can be judged to be starting trouble which is not caused by HIC.
Check	Check the power wiring and connector wiring.
Correction	DCCT failure (replace PCB) or compressor failure
Example	—
Notes	Use a tester to measure the voltage between the DCCT output terminal on the rear of the PCB and the ground. If the voltage is not within 2 – 3 V, then the DCCT has malfunctioned.

(1) Electronic control valve (MOV1)

- MOV1: Measure the voltage between plug pin 5 and pins 1 through 4 at the CN41 connector (6P, white) on the outdoor unit control PCB. (Because of the pulse output, a simplified measurement method is used. Set the tester to the 12 V range; if the value displayed is approximately 4 V, then the voltage is normal.)

  If the voltage is normal, measure the resistance between connector pin 5 and pins 1 through 4.

  Resistance between pin 5 and pins 1 through 4 should be approximately 46 Ω for all. (If the result is 0 Ω or ∞, then replace the coil.)

(2) Crankcase heater

- Connect a clamp meter to 1 of the 2 crankcase heater wires and measure the current. The current is normal if the result is 0.15 A or higher.
  (As a guide, the current should be 0.14 A (180 V) – 0.17 A (220 V).)

Test Pin

When the test pin on the outdoor unit main control PCB is short-circuited, each part can be operated individually. After turning OFF the outdoor unit power, short circuit the test pin (CN44, white), then turn the power back ON.

The following operations will start after turning ON the outdoor unit power when the test pin (CN44, white) is short-circuited.

(1) Set DC fan motor at W5 (FM1 : 340 – 360 rpm, FM2 : 360 – 380 rpm).

(2) 20S turns ON for 0.5 sec.

(3) Check Inter-unit control wiring circuit.
If normal state, go to the next step. If not, it stops after LED1 starts blinking at 0.5 sec intervals and LED2 turns off.

(4) Connector CH1 turns ON for 0.5 sec.

(5) Do the test to read / write EEPROM.
If normal state, go to the next step. If not, it stops after LED1 starts blinking at 0.5 sec intervals and LED2 lights.

(6) Connector O_2 turns ON for 0.5 sec.

(7) Check inter-outdoor unit control wiring circuit to outdoor unit maintenance remote controller.
If normal state, go to the next step. If not, it stops after LED1 turns off and LED2 starts blinking at 0.5 sec intervals.

(8) LED1 turns ON for 0.5 sec.

(9) Do the test(1) of circuit for writing micro-computing software.
If normal state, go to the next step. If not, it stops after LED1 starts blinking and LED2 starts blinking at 0.5 sec intervals.

(10) LED2 turns ON for 0.5 sec.

(11) Do the test(2) of circuit for writing micro-computing software.
If normal state, go to the next step. If not, it stops after LED1 starts blinking and LED2 starts blinking at 0.5 sec intervals.

(12) Outputs listed below turn ON for 0.5 sec.

No.	Contents of output						
1	MOV1 – A						
2	MOV1 – B						
3	MOV1 – / A						
4	MOV1 – / B						
5							

– MEMO –